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EDITORIAL.

WE NOTE with pleasure that Messrs. Anton Eilers and W. B. Devereux have been elected directors of the Greene Consolidated Copper Company; Mr. Arthur S. Dwight is manager at the mine, therefore the company is now aided by technical ability of the highest order. We congratulate the shareholders on the final emergence of their enterprise from a muddled condition to that of an organization aided by the technical knowledge which is essential to such big mining and smelting operations.

CLOSE ESTIMATES put the production of pig iron in the United States, for the nine months ending with September, at 11,903,500 tons. This is about 88 per cent of the output for the corresponding period of last year. Should no unforeseen changes take place, the output of our blast furnaces for 1904 will be approximately 16,000,000 tons, or about 2,000,000 tons less than in 1903. Large as this reduction seems, the making of so great a quantity this year, and the fact that unsold stocks are not excessive, indicate that, after all, a substantial business has been done this year, though the contrast with a year ago is sufficient to produce the general effect of depression in the trade.

ATTENTION IS called by a correspondent, on another page, to the undoubted fact that analyses and calorific tests do not always indicate the true value of different kinds of coal. It is found in practice that one coal may give better satisfaction than another, though its analysis and test may not show so well. Something of this may be due, as our correspondent suggests, to varying methods of sampling coal. The latter point has never, we believe, been discussed, or systematically carried out. The subject of sampling and testing coal is one of much importance, and we hope that some of our readers will be moved to take up the discussion.

THE REPORT for the first half of the current year shows a considerable falling off in the production of pig iron in Great Britain. The output of steel was also less than in the first half of last year. Other accounts indicate, however, that the production of finished iron

and steel has been good, and that the decrease in raw iron, iron and steel has been largely due to the heavy sales of German pig iron and steel billets to the forges and rolling mills. In fact, some ironmasters are complaining of the extent to which foreign raw material is being used in making finished goods.

We deem it a useful part of our publication to give readers trustworthy descriptions of new processes. In this issue Mr. Donald Clark describes the Huntington-Heberlein process, and next week the Bradford-Carmichael. The former is now being installed at the smelter of the Peñoles Mining Company at Mapimi, Mexico; this is the only locality as yet where the process has been adopted on this continent.

The Governor of Western Australia has appointed a Commission, having three members, to inquire "into all or any of the matters pertaining to the estimates of values of ore reserves in the Great Boulder Perseverance gold mine and the share transactions consequent thereon, and to make recommendations as to any action which should be taken in respect of such transactions and to any legislative proposals which it may be desirable to submit to Parliament with a view to obtaining greater security for the investing public." We trust the inquiry will be thorough and fruitful of good results.

Explorations of the Canadian iron ranges during the present season have shown some encouraging results, especially on the Michipicoten. The Geological Survey officers engaged in this work report the discovery of several excellent prospects. This has been especially the case at Cameron lake and on the Pucaswa river, where there are indications of the existence of large bodies of magnetite. Work is now nearly over for the season, but it is to be resumed actively in the spring.

On another page we publish an article on the treatment of ore at the Ivanhoe mine in Western Australia. During the early development of the Kalgoorlie district the sulphide bogey was freely invoked by bear raiders, it being prophesied that the treatment of such refractory material would prove unprofitable. The efforts and achievements of the mine managers of Kalgoorlie in winning an ever-increasing extraction at a lessening cost have been chronicled from time to time in this Journal, and now that the Ivanhoe has won so creditable a record, we feel assured that the description by Mr. H. J. Brooke will be read with interest.

During July the Ivanhoe treated 15,834 tons of ore for a yield of 10,540 oz. fine gold, valued at $216,993.85. The main heads of expenditures were: Mining, $2.25; treatment, $2.32, and general expense 31c. per ton, making a total of $4.88 per ton. The average value of the material treated was 13 dwt. 7 gr. per ton, and it speaks well for the management that on such low-grade ore they were able to make a profit for the month of $114,416.35. Of the 15,834 tons treated, the 100-stamp mill crushed 15,362 tons, but the management expects to be able at an early date to bring the tonnage up to 16,000 per month, with treatment costs at $2.28 per ton.

The Broken Hill Proprietary mine ranks among the greatest of the mineral exploitations made by man. Discovered in 1884, and productive almost from the beginning, this mine has produced 7,115,879 tons of ore, which, in treatment, have yielded 662,303 tons of lead, 6,600 tons antimonial lead, 4,564 tons copper, 3,524 tons of silver, and about 2.5 tons of gold. There has been expended in plant $6,347,413, and $35,000,000 in wages to workmen. Dividends have included $40,429,600 in cash, and share bonuses equal to $8,458,400, making a total distribution of $48,888,000. In different ways the yield of this great mine has stimulated not only Australian industry, but that of other countries, for its yield of metals has affected the commerce of the entire world.

The cost of mining anthracite coal is given in the report of the Lehigh & Wilkes-Barre Coal Company, published recently, at $1.79 per ton, an amount which royalties and general expenses would bring up to $2.21 per ton. This report covers the year ending with June last, and the cost given is higher than that obtained from other reports covering the calendar year 1903. Thus the Delaware & Hudson Company gave a total, including general expenses, of $1.96, while the Delaware, Lackawanna & Western reported the cost of all coal mined and purchased at $1.79. The Lehigh & Wilkes-Barre states the average cost of coal bought from its tenants at $2.46, or considerably more than that of the coal from its own mines. These figures give the cost at the mines, and do not include transportation.

The 'center country' winze in the Victoria Quartz mine at Bendigo, Victoria, has reached a depth of 329 ft. below the 3,700-ft. level, or a total depth of 4,029 ft. A 'spur' or quartz feeder, four inches thick, and showing free gold, has been cut. This is the greatest depth at which man has extracted gold ore. According to measurements made by Mr. W. Rickards, the manager of the mine, the temperature of cross-cut, 226 ft. from the shaft, was 72°; in the winze 300 ft. below the cross-cut, 80°; near the bottom of the winze and 4,017 ft. below the surface, 83°. The excellence of the ventilation is due (1) to a circulation established up and down the two compartments of the winze; and (2) to the fact that the Victoria Quartz shaft acts as a downcast to a neighboring shaft, that of Lansell's 180 mine, so long the leader in deep mining.

EXPERTS AND EXPERTS.

Folly assumes various shapes and disguises; to the professional man the most objectionable is that masquerade of his own technical knowledge which disports itself under the guise of pseudo-scientific reports prepared by men who are an intimate mixture of the ignoramus and the charlatan. In this issue a correspondent, writing over the signature of "Engineer," quotes a glaring example of such practices and raises his voice in protest against the stultification of his own profession. We sympathize with him, but we hold out no immediate prospect of that happy day when the community will possess a touchstone by which it can determine without peradventure who is, and who is not, the real thing in the way of mining engineer. The only fit judges are the members of the profession to which the man claims to belong, and the only practical manner in which the layman can ascertain the status of the supposed engineer upon whose advice he expects to spend money, is to ask those who are informed concerning the technical requirements of the case.

Certainly, the farcical statements of such a report as our correspondent quotes would be more humorous if they were not unfortunately taken as gospel by the people of small means, whom they are intended to beguile. It should be unnecessary to inform our readers that membership in any institute carries with it no diploma of reliability; our American Institute of Mining Engineers expressly avoids giving any such assurance, and is open to all who, engaged in mining or metallurgy, are nominated by three members. It is an association for the publication of technical information and cannot, from the very breadth of its foundation, undertake an enquiry into the character of each applicant. As to sham-geological claptrap, such as is quoted by "Engineer," one can only state these "delirious trimmings" are so absurd, that people who are deceived by them need a guardian. They certainly are not subscribers to this Journal, for even the non-technical reader possessed of the rudiments of geological knowledge from an occasional glance through these columns, would not be deceived by such balderdash. Much the same can be said regarding statements of assay-value, obviously based on picked samples, and concerning the unwarranted inferences made from neighborhood to rich mines. In the days of old Rameses these stories had paresis. We cannot reach the people to whom these vagaries of literature appeal; our readers are not victimized by them—at least we think not; if they are they deserve the inevitable disaster which awaits them. No, Mr. "Engineer," the only way to stop this nefarious business is to teach the public that advice which costs nothing is worth just what is paid for it; that mining

requires skill and experience beyond descriptive writing of a loose kind; that every industry has professional men who are qualified to serve as advisers, and are willing to act under the usual business engagement; that other advisers are a snare and a delusion; and finally, to urge the Post Office department of the national Government to keep up its successful efforts to prevent the misuse of the mails for fraudulent purposes. In the meantime, Mr. "Engineer," we will join with you in emphasizing the fact that any investor who cares to take the trouble, can get at the value of such rigmarole as that of the report you quote by asking some reputable mining engineer, and if he has no such gentleman in his acquaintance, he had better hasten to secure an introduction for his own sake and that of his friends.

RHODESIA.

At the meeting held on October 10 the capital of the British South Africa Company was increased by one million shares, issued at a little over five dollars per share; this will make the issued capital $30,000,000 and the total capital raised, including debentures and loans, about $55,000,000. Against this there are share-holdings, in companies formed to develop the region, having a nominal value of about $5,700,000, expenditures for concessions, roads and public works of all kinds amounting to nearly $10,000,000, war and defence expenditure aggregating $13,500,000 and a deficit of $18,000,000.

So far, therefore, this splendid enterprise has not been a money-making scheme, although there is nothing to lessen its general importance as a great factor in the conquest of the African hinterland. In April of the current year, the population of Mashonaland and Matabeleland combined was 591,197, the cattle numbered 94,544, the sheep and goats 415,839, and the acreage under cultivation 631,088. The most significant fact, however, is the smallness of the white population, numbering only 13,000, the bulk of which is engaged in mining. It must be remembered that eight years ago disease devastated the live-stock, that four years ago war disorganized industry, and that up to the present moment the lack of railway facilities has crippled the development of a large part of this great territory, which fitly bears the name of its founder, the lion-hearted Cecil John Rhodes. The railway from Kimberley reached Bulawayo, the site of Lobengula's kraal, in October, 1897. In May, 1899, Salisbury was reached from Beira. In 1898 Cecil Rhodes and Sir Charles Metcalfe formulated a scheme to extend the railroad irom Bulawayo to the Zambesi and thence to Lake Tanganyika. In September, 1903, the line was constructed to the Wankie coal-field, 200 miles from Bulawayo. In April, 1904, by an extension 75 miles long, the railroad reached the Victoria Falls of the Zambesi and stopped, pending the bridging of the great chasm, where 35,000,000 horse-power runs to waste. A steel bridge is now in course of erection; it will be of cantilever construction, with a span 650 ft. long.

Next year the British Association for the Advancement of Science holds its annual meeting in South Africa, and it is expected that the visiting members will be able to cross the Zambesi by rail over this great bridge. The president of the Association will be Professor George Darwin. To the sentiment of an educated man there has never been any event more eloquent of suggestion than a session of the British Association for the Advancement of Science under the presidency of the son of Charles Darwin at the railroad crossing on the Zambesi river, 24 years after Livingstone was rescued by Stanley and only fifteen years since Stanley himself emerged from his last exploration of the Dark Continent!

Thus far have we strayed from the finances of the Chartered Company, and we do not apologize. What it has done is measured in terms other than those of money.

IRON AND STEEL PRODUCTION.

The figures collected for 'The Mineral Industry,' Vol. XII—in most cases official, and in a few closely estimated from official data—show that the total production of pig iron in 1903 was 46,733,000 metric tons. Although the United States output was nearly stationary, and several countries—such as Canada and Russia—showed decreases, the total exhibits a gain of 5.5 per cent over the previous year, and is evidence of the activity of trade and construction all over the world.

The following table gives the quantity of pig iron made in 1902 and 1903, the figures being reduced to metric tons, for purposes of comparison:

Pig Iron Production of the World.
(In metric tons.)

	1902.	1903.	Changes.
United States	18,003,448	18,297,400	I. 293,952
Germany	8,402,660	10,085,634	I. 1,682,974
Great Britain	8,653,976	8,952,183	I. 298,207
Three chief producers	35,060,084	37,335,217	I. 2,275,133
Austria-Hungary	1,335,000	1,355,000	I. 20,000
Belgium	1,102,910	1,216,500	I. 113,590
Canada	324,670	265,418	D. 59,252
France	2,427,427	2,827,668	I. 400,241
Italy	24,500	28,250	I. 3,750
Russia	2,566,000	2,210,000	D. 356,000
Spain	330,747	380,284	I. 49,537
Sweden	524,400	489,700	D. 34,700
Other countries	615,000	625,000	I. 10,000
Total	44,310,738	46,733,037	I. 2,432,299

The increase was largely due to the gain of 20 per cent by the German blast furnaces, though it was assisted by other European countries, all of which, except Russia, had a prosperous year. The German increases kept up the proportion of the total made by three leading producers, which was 79.9 per cent of the total in 1903, against 79.1 per cent in 1902; although the proportion furnished by the United States alone fell from 40.6 per cent in 1902 to 38.9 per cent last year.

We can better estimate this great production when we say that it amounted to an average of 30 kilograms of iron per capita, for every inhabitant of the earth. To make it, required the handling of approximately 160,000,000 tons of material—ore, fuel and flux—apart from the transportation of the finished iron.

The proportion of pig iron made into steel, which had been steadily increasing for a considerable period, received a slight check last year. The total steel produced showed a gain of only 2.5 per cent, as against 5.5 per cent in pig iron. This was due to a decline in American steel production, and to a greater output of foundry iron in Germany and Great Britain.

The total steel production of the world is given in the following table, also in metric tons:

Steel Production of the World.
(In metric tons.)

	1902.	1903.	Changes.
United States	15,186,406	14,768,593	D. 417,813
Germany	7,780,682	8,801,515	I. 1,020,833
Great Britain	5,102,420	5,114,647	I. 12,227
Three chief producers	28,069,508	28,684,755	I. 615,247
Austria-Hungary	1,143,900	1,146,000	I. 2,100
Belgium	776,875	981,740	I. 204,865
Canada	184,950	132,500	D. 52,450
France	1,635,300	1,854,620	I. 219,320
Italy	119,500	116,000	D. 3,500
Russia	1,730,250	1,525,000	D. 205,250
Spain	163,564	199,642	I. 36,078
Sweden	283,500	310,000	I. 26,500
Other countries	412,000	418,000	I. 6,000
Total	34,519,347	35,368,257	I. 848,910

The United States showed a decrease of 2.8 per cent, while Germany's gain in steel was 13.1 per cent and that of Great Britain 0.2 per cent only, against increases of 20 per cent and 3.4 per cent, respectively, in pig iron. The United States last year made 41.8 per cent of the total steel, against 44 per cent in 1902; while the three leading producers reported 81.1 per cent of the total, as compared with 81.3 per cent in the preceding year. Germany, which took the second place as an iron producer for the first time in 1903, has long been far ahead of Great Britain in steel. The British iron-masters have kept up the manufacture of wrought, or puddled, iron to a greater extent than those of any other country.

The following table gives the ratio of steel to pig iron production in the leading nations; and also in the total output:

Ratio of Steel to Pig Iron.

	1902.	1903.	Changes.
United States	84.4	80.7	D. 3.7
Germany	92.6	87.3	D. 5.3
Great Britain	59.0	57.1	D. 1.9
Three chief producers	80.1	76.8	D. 3.3
Entire production	77.9	75.7	D. 2.2

That is, over three-quarters of the iron made reaches the consumers as steel, and less than one-quarter in the various forms of cast and wrought iron. Over three-quarters of the pig passes through the converter or the open-hearth furnace, before it is manufactured into finished forms.

A marked feature of the iron trade in 1903 was the withdrawal of the United States, to a large extent, from the list of exporting nations. The active condition of trade at home during a large part of the year induced manu-

facturers to give up their foreign business, and in some cases they found it necessary to import iron and steel. It was largely to this that the increase in German output and trade was due. This year, conditions have been reversed, but the export business has hardly been recovered.

FINE COAL AND COAL DUST AS FUEL.

At the World's Fair in St. Louis is a coal-testing plant erected and maintained by the United States government for determining the composition and testing the fuel value of American coals. The plant includes machinery for the manufacture of briquettes. The government made an appropriation of sixty thousand dollars to cover the cost of erecting and maintaining this plant, though some of the machinery was contributed by manufacturers, and the railroads made no freight charges on the equipment. The object of the tests is to put on record a mass of carefully compiled data that shall have all the weight that comes from government supervision and shall serve to establish certain standards for comparison of chemical composition and fuel value. A prominent manufacturer pertinently suggests that the tests be further elaborated by testing the practicability of burning coal in the form of dust as well as in the form of briquettes. This suggestion is so reasonable that we gladly call attention to the matter. The manufacture of briquettes, while an attractive possibility in this country, is at present practically confined to the State of California, and its growth is scarcely likely to be of importance, except in certain localities where low-grade coal can be briquetted at a profit, owing to the high price of good coal. No doubt the process will be utilized some day for making good fuel from dirty and friable lignite deposits in the West, or for utilizing mine wastes at some of the great coal-burning centers of the East.

As a fuel pulverized coal is an actuality, not a possibility. In the manufacture of portland cement, it has been of high value in reducing the cost of burning clinker; indeed, it is perhaps the one factor that has done most for the rapid advance of the American portland cement industry to its present commanding position. As a boiler fuel it offers these special advantages: Thorough combustion, small amount of ash to be handled, and reduction of manual labor. Special devices for burning coal dust have been installed at a number of manufacturing plants and the results reported show a large percentage of saving. It would seem, therefore, that official tests of coal dust as boiler fuel should form part of the work now under way at St. Louis. The wastefulness of boiler firing by shovel as ordinarily practiced needs no reminder. Hence the utilization of the highest possible percentage of the heat units in a pound of coal should appeal not only to the man who pays for the coal, but to every man who thinks of the importance of conserving the fuel resources of this country.

We understand that Dr. Holmes, who has charge of the plant at St. Louis, and Mr. Parker would both be glad to see the government extend investigations in this direction.

MARKET CONDITIONS.

Oct. 19.

The metal markets show no decrease in the strength and activity which was reported last week. Copper has been very firm, with a good domestic demand and continued buying for export to Europe. Purchases for Chinese account still continue.

Tin is the one exception, the fluctuations in this metal having been in a general downward direction. Lead shows a strong consumption, and there are indications of an advance in price before long. Spelter continues very firm, with a good demand, and prices abroad are also high. In the Joplin ore market, however, there has been some decrease in zinc ore quotations, which was not unexpected, as the prices paid recently have been higher than were warranted by those of the metal.

In silver there has been only moderate fluctuations during the week, but the market upon the whole shows an advance. Exports from the United States continue heavy.

The iron and steel markets show a decided improvement. Demand for both raw and finished materials has been very good, with the result that producers generally are inclined to advance prices, at any rate for next year's delivery. It is reported that some considerable orders for export business have been taken, especially in rails.

The western coal markets are generally firm, and the demand for steam coals is improving. The lake trade is good, the present disposition being to rush as much coal up to the northwest as possible before the close of navigation. Domestic coals are a little quiet, owing to the continuance of mild weather.

The Atlantic seaboard bituminous trade, while it has improved slightly in certain territories, still finds that the tonnage offered by shippers is in excess of the total needs of consumers. Only the better grades of coal are in demand.

In the anthracite trade there has been no change in the general situation. Mild weather has again helped to restrict retail buying, and wholesale trade shows little activity. The market is, in fact, on a strictly weather basis.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The first engines erected for the use of blast-furnace gas served only for the generation of electricity, but subsequently these gas-engines were coupled direct to the blast-furnace blowing engines, and of late the gas-engine worked by waste gas from the blast furnace has, in Europe, entered into sharp competition with the steam-driven engine.

Installations of importance for the economic utilization of coke-oven gases for producing power in Germany include the 200-h.p. motor in the Saar coal-field, at Neunkirchen; 125-h.p. engine at the Minister Stein colliery; 350-h.p. engine at the Lothringen colliery; four Koerting motors of 300 h.p. each at Beuthen, in Upper Silesia, and a 600-h.p. motor at the Borsig works.

Four and one-half tons of coal per trip, from a depth of 444 yd., at the rate of 80 trips hourly, is the record of the compound winding engine erected on the Sherwood colliery, near Mansfield, Nottinghamshire, England. The cylinders are 32 and 53 in. diam., with a 66-in. stroke. The boiler pressure is 150 pounds.

The Chief Russian coal fields are in the Donetz basin, between the Don and the Dnieper rivers, about two-thirds of the output of European Russia coming from there. Russian Poland produces about one-quarter of the total. The total output of Russia in 1903 was over 16,000,000 metric tons.

Lampblack has been successfully used as a fuel at the works of the United Gas & Electric Company, of San José, Cal. The lampblack is burned on grates made up in three sections, 8 in. long each, with spaces 5/8 in. wide between, and ½-in. slots in the bars. It is mixed with heavy tar and the partially-consumed and coked lampblack from the ash pit, and when ready for firing contains about 30 per cent moisture. Thoroughly dry lampblack is stated to have a heating value of about 14,200 British thermal units per pound.

Probably the greatest weights carried on the backs of men for any distance are the loads of ore brought up from the mines of the Andes by the miners of Chile. In a copper mine in a ravine leading from the main range of the Cordilleras, all the ore is carried a vertical distance of 450 ft., and the average weight per man is 250 lb. This load is carried up ladders made of notched trunks of trees, set almost upright, one touching the other.

The beginnings of metallurgy are of unknown antiquity. Recent discoveries in Mesopotamia show that people who inhabited the Euphrates valley 6,000 years ago knew how to work metals.

The first conception of a practical compressed-air locomotive probably was that disclosed in Wright's English patent of April, 1828, in which he proposed the use of iron cylinders under a tram-car, with an additional cylinder for heating the air by a furnace, to increase its expansive force.

The term 'asbestos' means unquenchable, inextinguishable, inconsumable. It is derived directly from the Greek, the Spanish form being *asbesto* and the French *asbeste*. It is described in a French work as *minéral filamenteux et incombustible*. The Germans call it *steinflachs* (stone-flax), and the Italians *amianto*, from the Greek *amiantos*, signifying pure, incorruptible. The French-Canadian calls it *pierre-à-coton* (cotton-stone), in allusion to the cottony appearance of the fiber.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of The Engineering and Mining Journal.

IN DEFENCE OF THE MINING ENGINEER.

The Editor:

Sir—From time to time articles have appeared in the columns of the Journal urging the investing public to employ only such men as are qualified and experienced in their work, men whose integrity cannot be questioned, for the examination of mining property. Nothing can be so harmful to the capitalist or so detrimental to the profession as the publication of a statement, couched in ambiguous terms and headed, 'A Report.' Already the field is overrun with so-called mining engineers, or experts, as they generally style themselves, who, having acquired a smattering of general knowledge from the perusal of text-books, launch out into the world with an affixed 'M.E.' to gull the unsuspecting public. I remember well an incident that occurred during my visit to the Lake of the Woods district, some years ago, which will bear repetition. A certain individual dressed in all the equipment common to his type—khaki suit, knee-boots, gaiters, a brace of six-shooters prominently displayed in his carved leather belt—was accosted by a little urchin selling the local newspaper, with the cry of 'Miner, sir, Miner!' With a look of the utmost contempt, and a voice choking with suppressed anger, the man replied: "D—— you, boy, I'm not a miner; I'm a mining expert."

Something should be done to suppress this element, and I trust you will find it possible to give the subject a place in the columns of your paper. While it is impossible to prevent such men misrepresenting themselves, and posing as shining lights in the profession, every effort should be made to prevent the bartering of their wares. It behooves investors to investigate the standing, qualifications and experience of the men sent out to express an opinion on any mining property, and none but those whose word can be absolutely relied upon to give an intelligent statement of things as they exist, with reasonable inferences and deductions, should be employed. To many promoters and stock-jobbers an honest expression of opinion is not wanted. Should it be necessary to boom the stock, the man who will do the work for the least money, and who has the faculty of seeing things as they might be, rather than as they are, is the one chosen, and the report is published broadcast. The poor laborer, who, by dint of long practiced economy, has accumulated a few dollars, is stupefied by the glowing statements of these surreptitious reports, and regardless of the cost, plunges blindly into the venture, only to find himself robbed of his earnings, the unhappy possessor of worthless stock certificates, and embittered against all that pertains to mining. Can nothing be done to stop such a practice?

Quite recently in one of the leading newspapers of California an advertisement to boom a certain property appeared, in which the report of an 'expert' was quoted, in extenso. As an introduction to this report the company advertising the stock for sale spoke of the man as one "than whom there is no better or more favorably known mining engineer and field man on the Coast, a member of the Institute of Mining Engineers, and who includes among his numerous claims to recognition the gratifying fact of several years association with . . . ." A few extracts from this report may prove interesting reading.

"Geological Formations.—The entire geological formation of this section of country consists of rhyolite, trachyte, and a series of porphyry dykes permeating this section in a northeasterly and southwesterly strike. This property is located at an elevation of 6,140 feet above sea-level, and is a prolongation of the structural formation of the . . . claims, and the productive properties of the . . . district.

"Development.—This property has been developed by a series of open cuts, demonstrating the continuity and permanency of the intrusive dykes of porphyry, which on this property are particularly *in situ.* The mineralization is exceedingly strong, the characteristics of this property parallel the mineralogical conditions of the great productive mines of this district. From the development done at the time of my examination, sufficient work had been completed to demonstrate the permanency of the vein matter. The attrition and striation prove beyond any doubt geologically the fact that the vein matter was purely eruptive, going down to interminable depths.

"Ore and form of ore-shoots.—The ore consists primarily of oxides and carbonates of iron, hematite of iron being the most predominating; also clay and talc and occasionally masses of white talcose vein matter containing loose quartz grains. The highest grade of ore in this property is carried in the porphyry. The character of the ore from a milling standpoint is concentrating, most of the values being obtainable on the plates. . . . This property and the ores thereof is perfectly dry, and no change of character of ore has been encountered with the depth so far attained in mining. At the time of my examination a depth of 20 ft. had been attained, and judging from the characteristics shown at that depth, the metallurgical conditions parallel the conditions of the . . . . the most productive mines of this camp.

"Values.—From the samples I took on this property, I find values as follows: Samples of porphyry I obtained values from $14 to $19 in gold. From the pure vein matter contained within two well-defined walls, I obtained values as high as $49 in gold. From the qualitative analysis of the gold ore, I find the gold ore was of abnormal high grade, running as high as 925.

"Equipment.—For the future advantage of this property I would justify the construction of a hoisting plant to enable the practical and economical advantage of this property to be carried out at a minimum cost to a depth of 500 ft."

In the general remarks which follow, this optimistic gentleman further states that, "From the thorough examination of the geological and metallurgical conditions of this property it is unnecessary to dilate upon the great possibilities of this particular property. To the practical mining engineer and geologist, who proves his deductions from results that have been demonstrated under similar conditions, there can be no doubt as to the ultimate possibilities of this property. The abnormal results that have been obtained from properties on the prolongation of the mineral zone in which this property is located, there can be no doubt as to the vast possibilities which will result in the practical advantage of this property."

One of the great advantages of mining in this district is that "the matrix carrying abnormally high-grade ores are superficially in evidence."

As to the future of this wonderful property, he says: "The possibilities of this property are beyond any doubt unequaled. The only conditions necessary to produce large and productive results are the practical extraction of the ores which exist. And the existence of much ore has been demonstrated by the work so far done on the two claims constituting this group."

Extreme measures ought to be taken to prevent the publication of such outrageous statements. To the mining engineer, the ludicrous side at once presents itself, but the general public are ensnared by these promises of fabulous wealth, and suffer accordingly.

Engineer.

Los Angeles, Oct. 3, 1904.

TESTS OF FUEL.

The Editor:

Sir—Your editorial on 'Standards in Washing Coal,' which appeared in your publication of September 29; also the article in the same number on the 'Determination of Ash in Coal,' suggests a topic of live interest to many of us who are connected with the fuel business—namely, the unsatisfactory evidences given by analyses and by the calorimeter tests of fuels from the practical standpoint of the producer and the consumer.

I may go farther and say that even the elaborate series of boiler tests now being made by the mechanical departments of several of the universities are not giving the comparisons hoped for. It can at once be granted that the analytical work itself is correct, and that the boiler tests are as carefully made as the conditions permit, but, I think, the questions involved have been treated too much from an academic standpoint.

To illustrate, the Mechanical Department of the University of Illinois is making a most creditable effort to cover the ground, as regards boiler tests. They have made a large number of tests of Illinois coals from the various mines and have published results, which have been accepted with a good deal of confidence by many, yet in a considerable number of tests the results obtained have been in entire contradiction to the selling prices of the coals in the competitive markets, and after all this is the final, practical test. This contradictory result is probably brought about by not having the proper grates or the best adapted type of boiler for certain of the fuels; then there is the unfamiliarity of the fireman with the fuel being tested.

From tests conducted by me on the same kind of fuel under different types of boilers, I find there is a considerable difference in the results; that a boiler best suited to one coal may show poorly with another kind. I have observed as wide a variation as 10 per cent in well designed boilers of different types.

Again, any tests of this nature are necessarily of short duration; it is usually necessary to fire by hand in testing a boiler, and here comes in the element of uncertainty. In a certain test made by me I obtained an evaporation of only 5.5 lb. of water per pound of coal from a certain mine of Illinois, the fireman being inexperienced with the coal. Dissatisfied with the results, I secured an expert fireman and with the same coal and

boiler obtained a result of 7 lb. of water per pound of coal.

A great many mechanical engineers, who are unfamiliar with the conditions under which coal is found and mined, attempt to standardize coal in making evaporation tests by reducing or, literally, raising them to the basis of a so-called 'dry coal.' As a matter of fact they are doing just the opposite of standardizing. I have observed such tests by representatives of a prominent engineering firm, where a box of coal was put on top of the boiler for 24 hours, with a consequent loss not only of the moisture, but of some of the lighter volatile matter, as it was very hot on top of the boiler; yet the evaporative results were figured out on this basis, producing an efficiency of the coal very much in excess of the true efficiency. Such a method may be proper enough with anthracite coal, or even with semi-anthracite, but it is entirely inadequate with coals high in volatile matter.

Take the lignitic coal, for example; it is normal for that to have a large amount of moisture in the pores of the coal. In practice I do not think any dividing line can be drawn between its accidental and its combined moisture. My personal opinion is that coal for testing should be used as quickly as possible and without any allowance for moisture.

Now, as regards chemical analysis, the Chemical Department of the University of Illinois has recently issued an interesting and instructive bulletin on the composition and analysis of coals of Illinois. This gives the results of 150 analyses with calorific tests on same. Nothing I have ever seen has demonstrated more to me the hopelessness—I may say, almost the absurdity—of attempting to buy coal on the basis of analysis, or calorific test, without full knowledge of how the samples are taken and the trustworthiness of the parties taking them. In this particular case the university obtained samples by sending to the various operators and asking them to send in 50-lb. samples of their lump or slack coal, as the case might be. Some of the operators probably took fairly average samples, but the tendency of the majority (as indicated by the returns) must have been to pick the best they had.

As any one knows, who is familiar with coal mines, the product varies, not only in the different parts of a section of the same seam, but in different parts of the same mine. The ash of the worst part of the coal may be, and frequently is, 200 or 300 per cent more than that of the best part. It is a very difficult question to determine what is the average, and it can be done only by the most careful sampling, yet it is getting to be the custom of consumers, who have no knowledge of the conditions, to ask the sellers for an analysis.

The seller is in a dilemma—if he shows the analysis of an average sample, it will be more than likely compared with the best coal of his competitor. In other words, the present idea of the buyer in asking for an analysis is ill-considered. It is not the system of analysis which is at fault, but rather that the system of sampling is entirely inadequate. There are certain results given in the paper—which is before me—which are in violation of well known market differences in the respective coals.

I do not wish to be understood as decrying the value of fuel analysis, as I personally use it to a great extent, particularly in prospecting and in new developments; but I regard it as having a negative rather than an affirmative value; that is, that an analysis does not show the true value of the coal as a fuel, leaving out of account anthracite, semi-anthracite and coke.

One of the mines with which I am connected produces a coal from a thick vein, high in moisture, high in ash and with considerable sulphur in it. The analysis of this coal utterly condemns it, yet after using it customers like it, since it has certain qualities which make it practically efficient. The relation of the carbon and volatile matter is such that it gives a hot flame without much smoke and is a free-burning coal and does not clinker; yet in selling the company does not venture to show the analysis. As yet there is something in the relation of the moisture, volatile matter and fixed carbon of the analysis that baffles us, in determining the practical fuel value of a coal.

Calometric tests also, while possibly of negative value for preliminary work, do not give any results on which close figures can be made. It appears to me that the work now being undertaken by the government in the testing plant at St. Louis is a step in the right direction. Something should be done to harmonize all these conflicting points, but I doubt if much good can be done unless the bureau is made a permanent one, and I trust it will be. In the past fuel-testing has been treated as a comparatively simple problem of analyzing and calorific testing, but I think there are more unknown quantities in the equation than the casual observer realizes.

This letter is written in a spirit of inquiry rather than a criticism of existing methods, but I trust it will draw fire, for I think it is a subject of great practical importance in this day of steam raising.

George S. Rice.

Chicago, Oct. 13, 1904.

GOLD PRODUCTION IN AUSTRALIA.

By Our Special Correspondent.

Official figures, compiled by the Mines Department of New South Wales, shows that, during the eight months of the current year ending with August there was a slight decrease in the gold production of Australia, as compared with the corresponding period in 1903. The following table shows the production of the different States for the eight months, four of them being official, while the comparatively small production for South Australia and Tasmania is estimated. The figures are in ounces of fine gold:

	1903.	1904.	Changes.
West Australia	1,390,660	1,313,865	D. 76,795
Victoria	484,860	502,839	I. 17,979
Queensland	429,963	414,839	D. 15,574
New South Wales	152,337	178,644	I. 20,307
South Australia and Tasmania	32,000	32,000	.....
Totals	2,489,820	2,441,737	D. 48,083

It will be noted that the principal decrease is shown in the reports from Western Australia; and this is due to the fact that the output from the mines at Kalgoorlie is a little below that of the previous year. Notwithstanding this, the production of this State is 55 per cent of the total output for the present year. In Queensland also there is a slight falling off. This was confined to the Charters Towers and Gympie fields, the Mount Morgan and the minor fields having shown considerable gains. The production reported from Victoria shows a satisfactory growth; this is largely due to satisfactory yields reported this year from the Bendigo gold-field.

THE CHEMISTRY AND METALLURGY OF COPPER.—I.

By Chas. S. Palmer.

The ancient legend is significant, and as beautiful as true, that when the metallurgical god was ordered to produce a metal combining the virtues of both gold and iron, he brought forth copper. This union of the beauty of gold and the toughness of iron suggests the comparative study of that great class of substances called the metals, and, in a secondary and still larger sense, the comparative study of their alloys. Therefore let us ask, what do we mean by the terms metal and metallic properties? It is strange to find some of our greatest authorities sadly at sea in the use of these terms. As an illustration, let me refer to that time-honored anomaly, the discussion whether hydrogen is, or is not, a metal. The error can be easily corrected, but it is essential that it be corrected and at once.

The words 'metal' and 'metallic' are used in two senses, sometimes parallel, at other times opposed. The one meaning of metal refers to such properties as weight, opacity, hardness or toughness, and the like. The properties are those which inhere in the common metals, iron, lead, zinc, copper, tin, silver, gold, and, we may add, mercury. These illustrate what may be called the *physical* properties of the metals, as distinguished from the *chemical* properties, which will be discussed immediately. Now, it will be noticed that as the list of the common metals was given, and as the mind followed along iron, lead, zinc, copper, tin, silver, and gold, there was clearly in sight the conception of some common property of weight, opaqueness, with more or less of toughness, but with the memory of mercury, there comes also a sudden interruption in the concept, or rather a modification of it, as we realize that mercury is one of the oldest metals, and yet illustrates the extreme of fluidity, or lack of all toughness. The conception is broadened; but it is still a clean-cut general notion of properties which the metals have *as they are*, and without changing their chemical constitution. All the properties considered thus far are physical properties, and it is the sum and average of these physical properties which is commonly referred to in using the term 'metal.'

There are other meanings of the words 'metal' and 'metallic.' These are illustrated by such substances as sodium, potassium, calcium and the like. It would be interesting to trace out the devious ways by which the word metal was applied to these curious births of the crucible; but they are here, and we must use them as they are. It should be first noted that in some of their physical properties, such as opacity, fusibility, and the like, sodium, potassium and calcium are closely comparable to lead and mercury, however much they may differ in weight. But the alkali metals have other properties which entirely overshadow the physical ones, such properties as the chemical action on water, the production of caustic alkaline hydrates, the making of hundreds of compounds soluble in water exhibiting the maxima of chemical activity, osmotic pressure, and electrical conductivity. Here we are introduced to a new significance to the terms under discussion; though there is doubtless the very closest connection between the physical and the chemical properties, both in their ultimate explanation and their immediate relation, we cannot afford to let the least confusion of thought or language dwell with our work.

Starting with this clear-cut difference between the use of the words 'metal' and 'metallic,' let us go at once to illustrations which will clinch the notion firmly in the mind. Is hydrogen a metal, or a non-metal? The answer is double; but it is distinct. In all the commonly received meanings of the word metal, such as weight, opaqueness, cohesion and toughness, hydrogen is totally lacking. Hydrogen is a non-metal, physically speaking. And this is no trick of temperature; for solidified hydrogen is not mercurial; it is an ice-like substance, like frozen water. The classification is distinct; physically hydrogen is not a metal; but this may not prevent it from making physically metallic alloys with some of the true physical metals.

Now, on the other hand, what is hydrogen chemically? Here the answer is surprisingly contrary to physical anticipation, and yet undoubtedly distinct. Chemically speaking, hydrogen is a metal, in the sense that sodium, potassium, and calcium are metals. The illustration and the proof likewise are to be found in such facts as these. It is the hydrogen of all acids which is replaced by metals (chemical metals) in making salts. In the electrolytic cell, hydrogen always appears at the cathode where all the other chemical metals appear. Again, the idea which is at the bottom of the chemical metal is the ability to make basic substances, such as the alkalies. Strictly in line with this is one of the great lessons of organic chemistry, to the effect that not only does the presence of hydrogen in ammonia and the ammonia derivatives account chiefly for their 'alkaloidal' properties; but in general the active or latent basic properties of many hydrocarbons may depend upon the heaping-up, as it were, of hydrogen in the molecule. For all these reasons, and many more incidental ones, it may be said without question that, chemically speaking, the properties of hydrogen are those of the basic metals, and hydrogen is strongly basic when its weight, or rather its levity, is considered, it being the lightest ponderable substance known.

The question of the metallic or non-metallic nature of hydrogen should be put in this way. Although hydrogen is physically a non-metal, and chemically a metal, is it still possible that it may form exceptional alloys in the physical sense with true physical metals; and may it also form equally exceptional non-metallic compounds with the metals in the chemical sense? Whatever may be the ultimate finding of the jury of science workers on the exceptional facts, the main fact stands out clearly, that hydrogen is, in all of its common behavior, physically a non-metal, and chemically a metal.

What is copper, a metal or a non-metal? It may seem strange to challenge this metallurgical veteran; but it is necessary for the correct understanding of the chemistry and metallurgy of copper. Copper is of course a metal, in all of its common and important physical properties; but in its chemical properties copper is intermediate between the metals and the non-metals. That is, this well-defined metal, from the physical standpoint, shows in its chemical relations a most pronounced ambiguity, and on the correct understanding of this ambiguity will depend the most successful and economical metallurgy, the theory and practice of which are capable of enormous development.

The chemical properties of copper include at least two distinct series of compounds, and traces of others. One of these, the 'normal,' is made up largely of substances which are insoluble, or soluble with difficulty, in ordinary water solutions; and for this reason the student is probably but ill acquainted with this series, the 'cuprous' compounds. It should be mentioned in passing that, as far as known, the properties of these cuprous compounds are those of fairly strong—not very strong—basic substances. The other great series of copper compounds, the 'cupric,' is the well-known group of soluble cupric compounds; but while the compounds are actual and available, yet from the chemical standpoint they are 'abnormal,' in the sense that copper acts as an apparent dyad, while the normal behavior of monad copper is limited to the insoluble series mentioned above.

Moreover, in this cupric series, copper is clearly ambiguous, as in the inability to form stable compounds with weak acids and acid residues, such as hydriodic, hydrocyanic, and sulphocyanic acids, and also in the tendency of the cupric hydroxide to dissolve in excess of sodic or potassic hydrate, this on the one hand showing the weakly basic and on the other the weakly acid nature. Nevertheless, we find most of the salts of most acids with copper in the cupric form, and in the electrolytic cell copper clearly follows the chemical metal law by coming down at the cathode, a fact that is of untold value in the commercial treatment of the metal.

There are other facts and aspects of the many-sided physics and chemistry of copper that will be referred to later in these pages; but this is sufficient to illustrate what is meant by the careful use of the term 'metal.' Of all the metals known to the ancients, none of them have well-defined chemically active basic properties, metallic in the alkali sense; but some of them have both acid and basic properties, and most of them, like copper, are ambiguous, but each in its own way.

We have thus far succeeded in clearing up the meaning of the word metal; and by noting the two lines of properties, the physical and the chemical. Let us now see what use may be made of this preliminary safeguard. Facts are facts, to be used, to be studied, and to be studied and used again. Every generation sees a closer relation between theory and practice; indeed, one safe measurement of the progress of that evanescent ideal called civilization is the closeness and helpfulness of fact and theory. Now, copper-making is a fact. So is the knowledge of the various chemical reactions of copper. The metallurgy of the metal, whether by the wet or dry methods, must continually touch upon these ambiguities. Whether the metal is to be extracted in a state of perfect purity, or whether a considerable contamination will suffice for commercial needs, depends largely upon what use is made of the distinction between the physical and the chemical metal. In the process of matte-making, at one moment we are confronted by the selective action of oxygen on the iron and copper sulphides, whereby the slight tendency of copper to form silicates apparently helps in keeping the copper out of the slag. At the next moment we are confronted by the relative affinities of copper for oxygen and sulphur, or even for carbon, in small quantities, as the refiner searches for the delicate differences between the various stages of 'dry,' under-poled, and over-poled copper. Or, in the wet processes, one may be met by the fact of the insolubility of the cuprous compounds, and at the next moment by the sympathetic solubility of cuprous chloride with the other chlorides present. Or, again, the apparently bad mechanical scheme of using converter lining to flux off the iron of mattes, may be supported by the great heat given out in the burning of iron and sulphur, and the union of the silica with the iron oxide—not to mention the strangely selective solubility of the values of the lining in the matte.

Even the metallic forms of pure copper, and those associated phases of brass, bronze, German silver and the like—even these are susceptible of nice discrimination and immense improvement in the combination of chemical and metallographic methods along the two lines of the physically and chemically metallic.

But there is another side to this nice discrimination between the meanings of the word 'metal,' a side that shows in part how the two uses of the word came into use. I refer to the historical growth of the term. The metals, gold, silver, tin, copper, mercury, lead and iron, were known to the ancients. How far back we can push the date of the working of these substances we do not yet know; but we do know that as soon as the anthropoid ape had clearly emerged from the cloud of pre-historic shiftlessness he became eager to use the metals, for obvious reasons. The knowledge of the best methods of winning these heavy, sometimes hard, but always valuable, substances from their ores was a matter of slow growth, but when once won it was held and handed on to the next generation. The practical knowledge of metallurgy, in the days of middle Rome, for example, was fairly comparable with that of our day. If anyone doubts this statement, let him study for a few hours the official catalogue of the collection of metallic relics from old Pompeii and Rome. We must be prepared to be astonished at the variety and abundance of every kind of tool and utensil—composed of an appropriate variety of metallic make-up. The collection of carpenter's and mechanic's tools, of surgeon's instruments, products of plumber's craft, such as well-wiped joints, and the like, will convince one that the ancients had their metals and metal-working. But the ancients did not regard these metals as elements in the modern sense; indeed, the conception of an element as measuring a fixed limit of decomposition was hardly grasped by them. But they had their metals and their methods of working them, and in spite of the confusing rivalry of alchemy and iatro-chemistry, steadily down through the Middle Ages, one great fact was growing up. This fact was appropriated by the theorists of the day; but it is clearly an outgrowth from the practice of metallurgy. I refer to the fact which was crystallized under the theory of *phlogiston*, recognizing the great difference between the states of oxidation and reduction, the difference between the burnt and the unburnt. The theory of phlogiston was advanced by Becher about the year 1660, and was vigorously and skillfully pushed by his devoted pupil, Stahl. In a word, it teaches that combustible bodies contain a something inhering in various substances as long as they are in the combustible state. The process of combustion consists of the removal of this principle of combustion, phlogiston. The burnt or oxidized substance is what it is because it has lost its phlogiston. By treating the burnt or calcined substance with some

substance rich in phlogiston, such as wood, charcoal, or coal, the calcined substance could take on phlogiston again, and pass back to its original state of combustibility. The metals which could be oxidized and reduced, which could be carried back and forth between the metal state and that of the oxide or calcine, these metals were the best illustration of the theory of phlogiston. We see that, in a word, phlogiston was the principle of reducibility, in so far as the chemical side of it is concerned. The illustrations are perfect as far as the qualitative phase is concerned. We well remember, however, how the theory of phlogiston fell down before the simple quantitative tests of Lavoisier; and for many years it became the fashion to revile this great generalization of metallurgy, regarding the relations of reduced and oxidized metals. There is no such thing as phlogiston; but in addition to the chemical phase, there is another side to the phenomena discussed; I refer to the physical side, the energy relation.

It was the late Prof. J. P. Cooke, of Harvard, who used to remark that if in the old writings, the word 'phlogiston' were erased, and substituted by the word 'energy,' most of the text would then read very much like some clear-headed modern treatise on the physical relation of oxidized and reduced substances. The statement can be verified; and it is significant of the great processes worked out by the old metallurgists. But the modern metallurgist has the same problems of the chemical relations between the oxidized and reduced states of the metals, and particularly of the cost of these relations, due largely to the value of labor and energy. The last two factors were formerly almost synonymous; but with labor-saving machinery and cheap fuel we are coming closer to the supreme struggle with the cost of energy itself.

This résumé of the growth and decline of the doctrine of phlogiston helps us to understand how the double meaning of the word 'metal' came into unconscious use; it also enables us to see the necessity of discriminating between the physical and the chemical property at every stage of each metallurgical process.

But there are one or two other important points which, though of a general nature, yet are so important that they can not be neglected. One of these is the relation between matter and energy; another is the analogy and the contrast between the field of fusion and the field of solution.

The familiar field of the old metallurgist was, and chiefly still is, that of fusion. The comparison and parallelism between the hot fusion and the cooler solution; these were supposed to be close and direct. It was forgotten that we do not look primarily to the conditions of either solids or liquids for our fundamental facts and inferences regarding the molecular and atomic activities of matter, but it is to the behavior of gases that we are indebted for our knowledge of these scientific symbolisms. True it is that lately we have been able to look into the structure of liquids and their contents; but it must be remembered that this is the analogy of the actions of gases. We are becoming familiar with the rôles of solvent and of solute, of the peculiar part-molecules called ions; and even with the doctrines of relative ionic velocities and frictions. But all this—or most of it—is applied to the field of the wet liquid, rather than to that of dry fusion. Indeed, we do not know yet just what are the fundamental conditions of chemical action and re-action in fused conditions.

To illustrate—for it is an illustration which always tests the definiteness of the idea—it was not till the time of Robert Boyle that chemists began to note the fundamental condition of acidity or alkalinity of solutions by the use of litmus and the like. These simple but all-powerful tests are not used even today for one-tenth what they are worth; and many a good student of chemistry would not care to be faced off-hand by a searching examination as to the nature and action of litmus. We may be pardoned for remarking in passing that red litmus in solution is essentially a non-ionized organic acid, while blue litmus is an ionized part (anion) of a salt of the same acid with the respective alkali which happens to be used. But to come directly to the point aimed at, and also to show the woeful lack of knowledge regarding the chemical state and action of fusion, let any one ask the trained metallurgist this question: What do you have to use in fusion that is comparable with the use and inference of litmus in solution? The answer will usually be a contemptuous silence. But contemptuous silence does not answer curious and interesting questions. We are brought up standing against the fact that we have no simple direct test for the condition of acidity or basicity of fusions! And to the thoughtful student the lack of this is nothing short of alarming. It is also mortifying to reflect that in some senses we are in a state of ignorance regarding fusion, which ignorance is closely comparable with the darkness overshadowing chemistry in the seventeenth century. To be sure, the well-trained furnaceman who knows his slags can tell something regarding the silica in the slag by cooling and stringing it on a rod, say, within five or ten per cent, and sometimes closer, if he has been following his analyses closely. But that is a feeling in the dark, where we ought to enjoy seeing in the light. To emphasize this point, it was a great discovery made a few years ago when it was found that fused cryolite conducts electricity, and it made the aluminum industry; but it is fair to say that probably not one metallurgist in ten thousand ever reflected whether or not the ordinary fused slag will conduct electricity or not. What the application of such information regarding the kind and degree of active or latent chemical affinity in molten substances would be no one can tell; but it is sufficiently humiliating to acknowledge that in this good year of 1904 we do not know what are the chief conditions of active chemical affinity in fusion of salts, neutral, or acid, or basic; though there is one golden fact that does stand out in experiment and practice, and that is that while the acid silica alone is relatively infusible, as is also the base, iron or lime or manganese, yet the salts formed therefrom are readily fusible. The discussion has proceeded far enough for the present purpose, but though I may return to it later, this observation may serve to lead other workers to analyze our ignorance of fusion, either in itself or as compared with solution, and from this to build up cautiously a foundation for the real chemistry of fusion of the future.

The historic significance of the relations of fusion and solution is heightened by the fact that the great qualitative principle of phlogiston, as illustrative of the grand balance between the oxidized and reduced condition of the metals, was worked out mainly from the study of fusion, assisted in part, to be sure, by the re-actions of wet solution. The result is more than accidental, for whatever may be the measure of our present ignorance regarding the true nature of the condition of the dry melt, yet that there is some parallel between the fields of solution and fusion is clearly evident from the practical reduction of metals. Here, again, I would emphasize the necessity of keeping closer to the distinction between the use of the terms 'metal' and 'metallic' in the physical and the chemical sense.

Another important point referred to is that of the relations of matter and energy. The story of the universe as likened to a great clock that is running down is almost trite; but there is a side of it that can never become stale as long as the children of men are forced to carry on the conflict with nature and with themselves. The great cost-sheet of life and business is emphasizing that what we are all struggling for is a supply of energy. New clothes, new food, new homes, all represent matter in a high state of energy; the old and worn-out remnants of these represent matter in a low or degraded state of energy.

So, though there may be cases where some kinds of matter are valuable for their intrinsic properties, yet these very properties will bear examination. To illustrate: the beauty, the permanence, and the rareness of gold; the strength and durability of iron; the inflammability of phosphorus, and the economical combustibility of zinc, or the like (in the primary cell of the future); each of these valuable properties, whether of the physically or chemically metallic, represents a reduced condition brought about by the consumption of so much energy. Thus gold is common in small quantities, and its value consists chiefly in the labor required to concentrate it. Iron and phosphorus and zinc are more abundant, and their value consists chiefly in the energy absorbed in reducing them to the 'free' state, And so the entropy equation rules over all, and its sway is emphasized in the making of the physical or chemical metal.

It appears sometimes that our modern science is none too modest in asserting the absolute accuracy of its generalizations, and it is possible that, with the appearance of some of the most recently observed phenomena, such as those connected with that paradoxical radium, we still have much to learn regarding the ultimate relations of matter and energy. The theory of the wasting away of atoms by the corruscating radiation of infinitesimal particles is too new to be classed among well-proved inductions. It is possible that there are sources of energy which are available for use by some kinds or conditions of matter, which sources may entirely transcend the older laws of the conservation of energy, or rather the old statements of conservation; but that there will still appear only greater laws and more accurate statements of these laws there can be no doubt. What may be the application of all this to the principles of metallurgy in general, and to that of copper in particular, it is not for me to say; but I may say that this many-sided copper must have its chance to address the jury before the case shall be closed. It will be a case in chancery for many scores of years to come, and meanwhile this matchless conductor of those curious influences which we call the electric current, and which may be the clearing-house accounts of the debits and credits of the ether tensions, will grow in constant sum and in adaptation to the realm of physics and chemistry.

COPPER MINES OF LAKE SUPERIOR.—II.

By T. A. RICKARD.

The Keweenaw peninsula, as measured along its line of departure from the mainland, is about 40 miles across, east to west, and extends northeastward into Lake Superior for about 70 miles. It is dominated by a central plateau rising to 600 ft. above the lake level, the general structure being that of a broad backbone of uptilted beds, largely of volcanic origin, flanked on both sides by sandstones, whose eroded edges slope under glacial drift to the shore. At Portage lake, where the peninsula is cut in two, the width is less than twenty miles.

The backbone of this landspur is a wide belt of rocks known as the Keweenaw series, comprising a succession of lavas of extrusive origin with interbedded layers of sandstone and conglomerate. While the igneous members of the series are composed of rocks differing in chemical and physical constitution, they can be described briefly as varieties of diabase,[1] considerably altered, with which are associated rocks of greater acidity, from porphyrites to quartz porphyries. The conglomerates are composed of rounded fragments of these rocks, the more acid predominating.

The Keweenaw series has a thickness of 25,000 to 30,000 ft.,[2] and in adjacent regions the thickness is even greater. Their strike, within the mining district, is from north 26° east to north 81° east, with a dip of 15° to 29° northwest, becoming steeper southward. The accompanying idealized section will give an idea of the geological section across the mining region anywhere between Houghton and Calumet. On the east, sandstone beds abut unconformably against the Keweenaw rocks; these standstones dip slightly to the southeast, and, by their fossils,[3] are known to be the equivalents of the Potsdam formation of New York, this being the top of the Cambrian. The sandstones on the opposite side of the peninsula, and overlying the Keweenaw rocks in apparent conformity, were considered by Rominger to be of identical age and as having been at one time continuous over the 'trap,' that is, the diabase layers of the Keweenaw series.[4] Pumpelly and Irving thought that this required too much erosion. Wadsworth claimed that the Keweenaw rocks are in places superposed over the eastern sandstone. The matter is further complicated by a vertical plane of demarkation along the contact of the trap series and the eastern sandstone, it being an open question whether this break in continuity is a gigantic fault or merely the cliff marking an ancient shore line. Pumpelly and Brooks held that the eroded conformable downward extension of the Keweenaw series would be found under the eastern sandstone, while Irving and Chamberlain considered that the east face of the Keweenaw series represented a fault-scarp, the downthrown part of the series being under these eastern sandstones. Hubbard holds to the existence of "an eroded line of steeply dipping and somewhat corrugated traps, against whose mural faces and over whose gentle slopes, respectively, the eastern sandstone was laid down."[5]

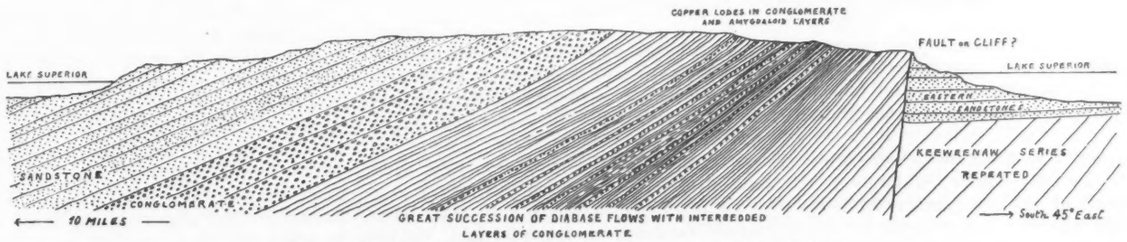
Native copper was first found in the transverse fissures crossing the Keweenaw series at the northern end of the peninsula; there the metal was found also to occur along certain beds of conglomerate and amygdaloid where intersected by the vein-fissures. Eventually it was proved that the copper occurred elsewhere, even more generously, in certain members of the series, forming impregnations conformable to the stratification and identified with persistent beds of amygdaloid and conglomerate. The diabase rocks include beds the upper layers of which are amygdaloidal, this structure representing the foamy surface of lava streams. As the pores or amygdules become filled with various minerals a compact rock results, and from a vesicular lava there is produced an amygdaloidal diabase. These pervious beds have become the place of ore deposition, and by reason of similar favorable physical conditions, the conglomerate layers also have been enriched with copper in certain localities so as to afford a basis for profitable mining.

The 'mineral range' of this region consists of a belt from four to six miles wide, constituting the eastern portion of the trappean series, the members of which vary in thickness[6] from a few feet to more than 100 ft., the individual layers being distinguishable, where they are not separated by beds of conglomerate, by the amygdaloidal character of their upper portion. The texture of the trap changes from compact at the bottom of an individual bed to vesicular near the top.[7] Dark green is the prevailing color, save where mineralization has been accompanied by the peroxidation of the iron. Labradorite and a ferruginous chlorite allied to delessite are the essential constituents of these traps,[8] but they owe many of their most notable characteristics to metamorphism, in the course of which chlorite has been formed from hornblende or augite, and epidote has filled the amygdules.

Furthermore, these amygdules contain a great variety of minerals, those now seen being chiefly secondary products which have replaced the original occupant of the cavity. Calcite, quartz, laumontite, prehnite, analcite and datolite may be mentioned, beside the epidote and chlorite, and finally there is that most important mineral of all—native copper. This is found crystalline in its own form, but frequently it has the shape of the amygdule which it fills, or, more rarely, it has the form of some other mineral which it has replaced. Both the amygdaloids and the conglomerates are heavily impregnated with epidote. Some of the porous epidotic amygdaloid layers have had copper deposited in them to such an extent as to produce large hackly masses of metal weighing several tons.

The Quincy lode, for instance, is essentially a soft brown and green amygdaloid forming the upper portion of a bed of diabase; the richest part of the lode channel, toward the hanging, represents the upper crust of a lava flow which was vesicular when extruded and is now amygdaloidal through the deposition of minerals, one of them being copper. The overlying bed is a dark, compact, fairly coarse diabase, the dark red color of which is due to the feldspar. The amygdaloid of the copper lode itself has a minutely crystalline groundmass containing acicular plagioclase and granules of magnetite, which has been oxidized to hematite.[9] The copper is sometimes pseudomorphic after laumontite and is also found enclosed within transparent scalenohedrons of calcite, the order of formation being laumontite, quartz, copper, calcite and datolite.

The conglomerates frequently enclose seams of fine-grained laminated sandstone, and in such beds an impregnation of copper is not uncommon. As a rule the pebbles of the conglomerate beds consist mainly of chocolate-colored felsitic porphyrite, the fragments of diabase and its amygdaloid being subordinate in amount. Finer silicious grains of the same material fill the interstices and cement the pebbles together, but this original binding material is now largely replaced by secondary minerals, such as calcite and epidote, together with chlorite and native copper. The conglomerate bed constituting the lode channel of the Calumet & Hecla is from 12 to 25 ft. thick, and dips northwest at from 36 to 39°. For a



GEOLOGICAL CROSS-SECTION OF THE COPPER MINING REGION.

[1] 'Diabase' is the term employed by Irving, 'melaphyr' that used by Pumpelly, and 'melaphyre' by the Michigan Geological Survey. The State Survey, of late years, has tried to reserve the term 'diabase' for intrusive rocks, although some of the Keweenaw beds undoubtedly have the structure of diabase. (See Vol. VI, Pt. I, pp. 169 and 220.) 'Melaphyre' as a rock name is now almost obsolete; "it should be restricted to an altered type and preferentially to the older altered basalts. The melaphyres will then bear somewhat the same relation to the basalts that the diabases do to the dolerite, and porphyrites to the andesites." (Geikie). In my descriptions I shall use the term 'trap' as a general name for the dark igneous rocks of the district, both diabase and porphyrite.

[2] Irving and Rominger.

[3] Found only in the Menominee district.

[4] C. Rominger. 'Geological Survey of Michigan.' Vol. V, Pt. I, p. 92.

[5] 'Geological Survey of Michigan,' Vol. VI, Pt. II, pp. 88–91 and p. 121.

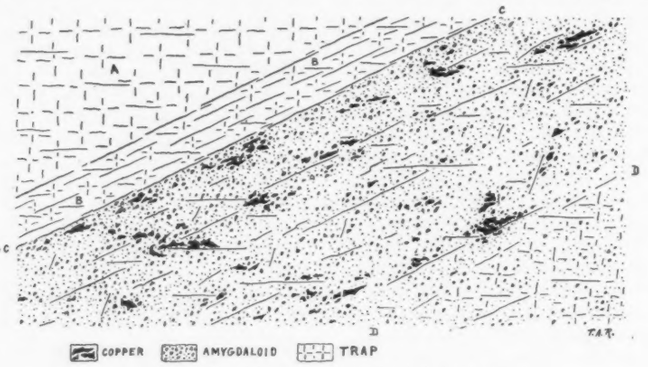
[6] The "Greenstone" is a particular bed over 1,000 ft. thick, which may, however, consist of several beds. Van Hise thinks it may have been intruded. Lane considered it to be a series of flows that followed each other in rapid succession. 'Geological Survey of Michigan,' Vol. VI, Pt. II, p. 74.

[7] Although occasionally the lower side also may be vesicular, which is quite in accord with what is known concerning the flow of lava streams, the bottom and top cooling rapidly by contact with the cold surface and the cold air, respectively, while the interior retains its heat for a long time. Similar conditions can be observed by watching the dumping of a slag pot.

[8] "The Paragenesis and Derivation of Copper and its Associates on Lake Superior," by Raphael Pumpelly. *American Journal of Science*, Vol. II, No. 9, p. 793.

[9] R. Pumpelly and C. Rominger.

length of two miles in this mining property there are but few barren spots, and the conglomerate is stoped continuously, save for pillars to support shafts, the average yield of copper being about 2.5 per cent. The rock is reddish brown and so compact that it breaks across the pebbles, which are the detritus of quartz porphyry and granite; the spaces between pebbles are filled with smaller granules bound together by a cement which is both silicious and calcareous. The metallic copper occupies the spaces between pebbles and often entirely replaces the cement; it also penetrates the capillary fractures in the pebbles and, indeed, the replacement has gone so far that even pebbles are



AMYGDALOID COPPER LODE IN QUINCY MINE.

turned into copper, the result being "a spongy skeleton of copper in an epidotic rock carrying calcite."[10] The hanging wall of this Calumet & Hecla lode is a dark-colored, fine-grained diabase.

The position and appearance of the succession of diabase beds indicate that they are extrusive sheets of lava; the upper amygdaloidal layers have a surface which is often scoriaceous, and contain sand, indicating that their extrusion was followed shortly afterward by sedimentation. Likely enough they were extruded under water. It is this sintery appearance which has provoked such local terms as "ash bed."

Movement of the Keweenaw series is manifested by several small displacements in the mines which I visited, but the most interesting evidence of this kind is the occurrence in the Central mine, where the so-called East vein is faulted along the Kearsarge conglomerate, the heave being 284 ft.; a dislocation which, as measured in terms of the displacement of the rocks lying above the Kearsarge conglomerate has been estimated as equivalent to a movement horizontally northward of over 2½ miles.[11]

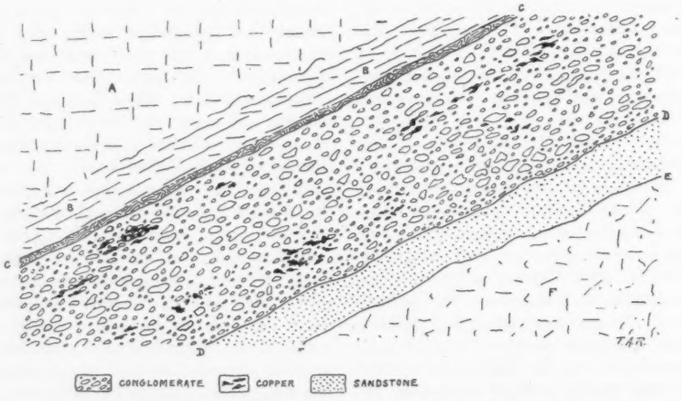
The distribution of the copper, as observed in the mine workings, is seen to be dependent upon the structure of the rock. In the Quincy the "main hanging wall" is marked by a slip or parting, of variable definition; back of this there is a band of shaly trap, which is apt to be troublesome by creating shaky ground. The lode itself is a brown amygdaloid with earthy fracture, spotted with amygdules consisting of green chlorite, white calcite and red laumontite. Copper occurs on quartz and pseudomorphic after laumontite. Chlorite is found distributed over both quartz and copper, penetrating the former. The calcite contains bright native copper; this mineral tends to arrangement in lines, giving the lode occasionally a streaky appearance. The rock is often vesicular, especially close to the 'hanging,' owing to void cavities. Capt. Thos. Whittle informed me that the lode is usually dry, but moist places are richest.[12] This simply means that in such portions of the lode the rock is less tight, possibly more vesicular, and permits of the descent of water through the interstices. The accompanying sketch will suggest the general structure of the Quincy bed.

At the Atlantic the copper is fairly disseminated from hanging to foot, that is, throughout the amygdaloid which constitutes the lode. Occasionally the richer rock favors one or other wall, and rarely the copper spreads beyond the hanging wall into the overlying trap. Cross-joints produce floors which make trouble in mining. It is found advisable occasionally to leave a width of copper rock rather than "leave the hanging bare." When the lode is narrow it carries about the same amount of copper per linear foot, so that it is richer per ton than where it is wide; when narrow, the ground is apt to be tight. On the footwall there is a "flint rock," a close-grained jaspery amygdaloid, but the bulk of the lode is a chocolate-colored rock, rich in laumontite. The amygdules are little museums. In a single amygdule one can distinguish the successive deposits of laumontite, copper, chlorite, calcite and epidote. The cavities now filled with these minerals appear to be long vesicles due to the expansion of water vapor or gas. Near D shaft on the 31st level I saw a cross-course, a band of fracturing across the lode and rendering it barren for a length of 40 to 50 ft. This transverse vein carries more calcite than the lode itself.

The distribution of copper in the Baltic mine is particularly irregular. The lode channel appears to be a sheared zone with a system of fracturing which has reached beyond the limits of the particular amygdaloidal layer into the encasing trap. Movement is indicated by slip-planes and cross-joints, especially a system dipping flatly southward. Occasionally slips dipping toward each other tend to form wedges of rock which make dangerous ground. Selvages are observable. At No. 4 a vein 4 to 5 in. wide exhibits this evidence of movement and crosses the lode channel in a distance of 200 ft.; it carries copper, with quartz and calcite. Most of the cross-veins, which are frequent, do not extend beyond the lode limits, and they are short-lived in any direction. Their strike usually conforms to that of the main lode channel, but in one of the upper stopes I saw a seam of chalcocite in the footwall dipping away from the lode. This seam was ¾ to 1 in. thick, enclosed between quartz. Specimens showing deposition of chalcocite on native copper also occur in the lode. In going through idle workings which have been extended in rich rock one can see the metallic copper sticking out, because it is tarnished black by the nitrous fumes generated by the explosives used in the mine.

In the Wolverine, wet ground is a good sign. Capt. William Pollard stated that "where there is water there is copper somewhere around." This confirms the experience at the Quincy, the best-producing ground being where the rock is vesicular, damp and inclined to be soft. The so-called walls of the Wolverine are at best but ill-defined boundaries. A persistent soft seam separates the reddish soft lode from the harder greenish-gray trap overlying. Copper is found extending into both walls. I noted sheet copper along cross-joints in the footwall; this is said to occur in the hanging also. The rock near the hanging is most amygdaloidal and is usually richest. In many places the presence of lump copper can be seen at a distance by reason of patches of light-colored decomposed rock. Nests of metallic copper occur in this soft matrix. The laumontite lines the amygdules and encloses calcite, while the copper is found replacing both of them.

Joints and long slip-planes cross the lode at a strong angle. These are apt to mark a change in the copper contents; if the rock is poor it becomes richer on the other side, or vice versa. This, however, is only a local ef-



CONGLOMERATE COPPER LODE IN FRANKLIN JUNIOR MINE.

[10] C. Rominger. 'Geological Survey of Michigan,' Vol. V, Pt. I, p. 116.

[11] L. L. Hubbard. 'Geological Survey of Michigan,' Vol. VI, Pt. II, pp. 88–91.

[12] In one place in the mine where a considerable flow of water enters through the footwall, metallic copper is now being deposited in notable quantity. And who can say but that a very slow precipitation may not be going on where the rock is only moist in the lower levels of this mine?

fect. Several cross-courses are encountered. They consist of bands—from a few inches to two feet wide—of barren shattered rock streaked with seams of white calcite. They appear to disturb the copper lode only slightly, not enough to affect mining disadvantageously. Copper is rare in these cross-veins, and then only close to the crossing. At the 25th level there was a boulder in the hanging, which looked as if the trap had rolled into a hollow in the surface of the amygdaloid, that is, as if hot lava had been extruded over the cold vesicular surface of an earlier flow.

It may be stated in a general way that the mineralization of the amygdaloidal lodes is diffused and irregular; the upper or hanging-wall limit to the profitable rock is occasionally fairly clear, but the foot is not. In the early days it was the great idea of Capt. Daniell and other authoritative mine managers to "keep to the hanging," and the custom was to run little drifts, which followed the course of the hanging, no matter how the lode might turn and twist. This is no longer the practice, for it is recognized that the distribution of the metal disregards suppositious walls, and in order to extract it properly a less narrow scheme of exploration is required.

The conglomerate lodes are better defined, as will be illustrated by the Franklin Junior mine, which I visited under the courteous guidance of Capt. John Doney and Mr. F. W. Sperr, professor of mining at the College of Mines. This mine is on the Boston and Albany conglomerate, which is the same as the Allouez conglomerate. At the 375-ft. level I saw the section reproduced on page 626. Under the outer body of hard trap constituting the hanging-wall country, there is 4 to 5 ft. of shattered trap, and between this and the conglomerate there is about one foot of flucan. This soft stuff varies in different parts of the mine from a mere selvage to a thickness of four feet. The copper-bearing conglomerate itself is from 8 to 25 ft. thick, narrowing northward and widening southward. Underneath it there is 3 to 4 ft. of sandstone, and below this comes the amygdaloidal trap of the main footwall country. The conglomerate breaks clean from the footwall sandstone; the latter shatters in slips, which make bad ground. In order to avoid the flucan in the hanging and decrease timbering expense, it is the custom to leave 4 or 5 ft. of conglomerate to support the ground, the value of the copper lost in this way being less than the expenditure otherwise required for extra timbering. As the successive levels are exhausted and abandoned, this shell is removed. The flucan is a breccia-selvage, a clay containing broken pieces of trap. Beyond it there are several feet of shaly ground which looks like a volcanic dust that has been deposited in water and subsequently consolidated. The lode is traversed by well-marked joints and slips; they are as well defined as the walls.

The reddish-brown feldspars of the porphyrite, constituting the principal detritus of which the conglomerate is built, give it a chocolate tinge. The pebbles range between the size of a pigeon's egg and that of a turkey; the largest boulders are the size of a man's head. When the conglomerate is not too coarse it is most favorable to copper, probably because the interstices between the larger boulders are filled with fine sand, which renders such a rock less permeable to mineralizing solutions. In hard ground, that is, where the conglomerate is so consolidated that it breaks across the pebbles, these cross-joints are prominent and make big, blocky ground. The best ore is in the looser conglomerate, where the fracture planes show projecting pebbles instead of clean-cut surfaces. Here, as in the amygdaloid lodes, the copper favors the permeable rock. No copper is found in the footwall sandstone; in the deeper levels, however, where the sandstone has thinned out, the conditions change, and copper extends from the conglomerate of the lode into the underlying amygdaloid. Here also there is an obvious connection with permeability, the closely cemented sandstone offering a bar to diffused mineralization. The sandstone is a reddish, clearly laminated rock; at surface it crumbles quickly on weathering, on account of its calcareous binding. Occasionally sandstone makes its appearance within the conglomerate, and is found persisting for a couple of hundred feet and a maximum thickness of seven or eight inches. Fine particles of copper are found in this sandstone, which differs in character from that on the footwall. There are also nodules of copper scattered through the flucan, and in the overlying trap a little flakey copper is found. At the 18th level—about 1,850 ft. from surface as measured on the 48° dip—the conglomerate lode lies on the amygdaloid; the latter has a humpy, billowy surface, and the parting between it and the conglomerate is tight, that is, the two beds adhere.

WHITE LEAD MANUFACTURE IN CANADA.—The Carter White Lead Company, of Chicago, has made arrangements to establish a large lead corroding industry in Montreal. The old shops of the Canadian Pacific on Delorimier avenue have been secured as premises for the new works. It is understood that the metal used will be electrolytic lead from the refinery at Trail, in British Columbia.

BRAZING METAL.—According to the *Metal Industry*, of New York, a brazing metal must be free from lead to stand brazing. A mixture of three parts of copper and one of spelter forms an excellent alloy for this purpose. One or 2 lb. of tin to 100 lb. of metal may be added to harden the metal, but is not recommended unless necessary. A red brazing metal may be made of 88 parts of copper, 10 parts of spelter and 2 parts of tin. Ordinary steam metal, if the lead is left out, may also be brazed, and, in fact, any red metal free from lead. The lead is what does the harm.

COKE FROM BY-PRODUCT OVENS.—The total coke made in the United States in 1903 was 25,262,360 net tons, as compared with 25,401,730 net tons in 1902. Of the 77,188 active ovens in 1903 there were 1,956 by-product ovens which produced 1,882,394 tons, or an average of 962.4 tons per oven. The average output of beehive ovens was 311 tons. The by-product ovens made 7.4 per cent of the total coke, against 5.5 per cent in 1902. The output of the by-product ovens in the current year will show a large increase, chiefly from the new plant of the Lackawanna Steel Company at Buffalo.

WATER-POWER IN BRAZIL.—A British consular report says that plans are under consideration for utilizing the water-power of the Paulo Affonso falls in Brazil. It is believed that these falls can be made to produce a great quantity of power.

MINING ENGINEERING AND MINING LAW.*

By JAMES D. HAGUE.

The vocation of the mining engineer is, primarily and in a general sense, the development of the mineral resources of the earth's crust. In his capacity as engineer he is chiefly concerned with practical methods of exploration, development and equipment of mines for current operations involving the mining and treatment of ore. As mining geologist, his eye and judgment must be trained in the study of ore deposits and vein formations, and of the physical conditions upon which depend the visible and prospective values of mines or mining ground, which he may be called upon to consider.

The fully qualified mining engineer and mining geologist, who has to deal with mines and mining properties of the public domain, owned and worked under the grants and terms of the laws of the United States, must be more than a practical or mechanical engineer, and more than a theoretical or practical geologist; he must be learned in the *law*.

If the mining engineer be called upon to consider the value of mining property, the title to which is derived from the grant of a mineral patent of the United States, issued under the laws of 1866, or of 1872, or if he have to do with the mining of veins or lodes which are worked in the exercise of rights granted by such mining patents, especially in the exercise of what is known as the "extralateral right," or the right to pursue the vein in depth, beyond the side-line boundary of the originally patented surface ground, and into the land adjoining, the engineer must know and duly consider not only the physical and geological conditions and the often questionable nature or character of the ore deposit, vein or lode, as granted within the limits of the patented ground (and the right to pursue which beyond such limits into his neighbor's premises he claims under the law), but he must also thoroughly know and duly appreciate the bearing and practical effect of all the essential and technical provisions of that law, relating either to the original grant of the surface ground or affecting the exercise of extralateral rights derived therefrom; and he will surely be liable to disastrous error if he fail to give due consideration to all the legally prescribed as well as to the physical conditions of his problem.

If the value of the mine in question largely depends, as it often does, upon the right of the owner to enter into the land adjoining, in pursuit of his vein inclined thereunder, it becomes a matter of vital importance to determine not only the physical structure and conditions of the vein or orebody, but also to fully apprehend the true relations of all these conditions to the prescribed terms of the law from which such extralateral right is derived, and for lack of essential or technical compliance with which that right may be, as it in many cases has been, forfeited.

Moreover, the value of the mine in question may depend not only upon the right of its owner to enter into the land adjoining, in pursuit of his vein dipping thereunder, but the real value of the property may also, on the other hand, depend upon the right of a neighboring owner to enter upon the ground in question and there possess as his own a vein or deposit contained therein, which, having an apparent

* Read, September 24, 1904, at the meeting of the Mining Engineering Section of the International Congress of Arts and Science, held in connection with the Universal Exposition at St. Louis. Contributed by the author.

or an alleged apex, real or only so-called, in the neighbor's claim, and dipping into the land adjoining—that is, into the ground in question—may be followed by such neighbor beyond the vertical plane of the side-line, which marks the surface boundary between the properties, and thus into the ground under consideration, possibly robbing the latter of all its real value, substantially dispossessing the real owner of the premises, and, if the claim of the intruding neighbor be maintained as lawful, practically destroying the title to the vein or lode, which was originally granted—and really intended to be granted—by the United States to the original patentee.

This disastrous condition may also arise from merely accidental or technical defects, which may be found, or made to appear, in the patented title, resulting from alleged non-compliance of existing conditions with prescribed terms of the law, involving the questionable character and the true place of the vein or lode, or of its "top or apex," its physical structure, the "downward course," and the precise relations of the lode to the surface boundaries of the patented claim, the parallelism or other geometrical relations of end-lines and side-lines of the survey, and the legal conditions and complications resulting therefrom.

These conditions, moreover, are so complicated by the many uncertainties and ambiguities of the language of the statute and terms of the patent, the widely differing and conflicting views and opinions of the experts, and the judicial rulings of the courts in construing the Acts of 1866 and 1872, that the law of 1872—which was enacted to simplify, establish and confirm a clear and unassailable title—sometimes wholly defeats its own good purpose, destroys the title which it was intended to create and maintain, and brings forth nothing but confusion and contention, with everlasting and costly litigation.

It is, therefore, easy to understand how it comes to pass that many of the most eminent American mining engineers of our time find the most important part of their professional business in rendering service as learned interpreters of the law and expert advocates in mining litigations. I remember to have heard, long ago, a reported dialogue between the late Mr. Justice Field, of the United States Supreme Court, and a certain highly distinguished member of the United States Senate, long and widely known as owner and operator of important gold and silver mines. The senator was, at the moment, engaged in conversation with Justice Field, and had related to him some interesting details of his mining operations in Mexico.

"I don't see why you need to go to Mexico for mines," said Mr. Justice Field; "haven't we enough good mines in our own country? Why do you go to Mexico?"

"We go there," replied the Senator, "because in Mexico there is no United States Supreme Court."

This is not the place, subject to the necessarily brief limitation of time, to attempt any adequate discussion of the merits or defects of the present law. The design of the extra-lateral right was praiseworthy in its purpose to protect the prospector and miner in the full possession of the vein or lode which he had discovered and developed, even though, in its downward course, it passed beyond the vertical boundary of his narrow surface-claim and entered into the land adjoining. As this adjoining land was presumably the public domain, the Government, as its sole owner, could doubtless dispose as it pleased of its own property, in thus granting such mining rights beneath its surface, without contravention of common law. But, however meritorious may have been the purpose to protect the discoverer, by statute, in the possession and full enjoyment of all his rights and privileges, the good intention of the act has, unfortunately, only paved the way to perdition for the title, not to the extra-lateral right or ground alone, but to the vein or lode contained within the original grant, which is, or may be, liable to practical forfeiture for non-compliance with essential terms of the law, which are made to depend upon indefinable conditions, indefinite limitations and indeterminate problems.

What is the vein or lode? What and where is its "top or apex"? What is its "downward course"? How shall be determined the linear extent of the lode in depth, between end-line planes produced from non-parallel, diverging, converging, broken, crooked, or otherwise non-conformable or unstatutable surface end-lines of variable direction, sometimes becoming side-lines, while side-lines become end-lines—sometimes projecting claims that radiate, like sweeping searchlights, into the extralateral ground, following the veins or lodes in whatever direction they are inclined to—and, finally, end-lines, now and again, which exist only infinitesimally or constructively, as may be the case when the patented claim ends, as it sometimes does, in a staked point?

How shall be determined the relative rights in extralateral ground of several neighboring claimants on and along the same curving, crooked or sinuous lode (or possibly, neighboring lodes), each of whose several patented claims has its own peculiar strike or course with corresponding dip, between duly parallel end-lines, or end-line planes produced therefrom, and all of whose extralateral rights, following the downward course of their several claims, according to their locations on the tortuous vein or lode (or different veins or lodes), may, and often inevitably must, meet in the adjoining land, intersecting and interfering with each other in many conflicting claims for the possession of the vein in depth?

Although the validity of such claims may sometimes be determined by priority of lode location or seniority of patent, such conflicts almost always involve the indefinite character or doubtful identity of the lode itself, and the all-important question of the true place of its "top or apex." But the apex, as Dr. Raymond said, many years ago, in one of his most valuable and illuminating contributions to mining literature on this subject, "is scarcely a more essential feature than the end-lines and the side-lines; for the rights which it may confer may be limited in various ways by these; so that we have, in many a case, the most ridiculous result that the United States, in return for the money of a citizen, conveys to him with much solemnity, under its broad seal, nobody knows what, bounded nobody can tell how."

What is the vein or lode? By the makers of the law it was apparently conceived as a typical mineral vein, of the "true fissure" variety, well defined, as in the dictionary, conforming, with rare simplicity of structure, to the descriptive terms of an ideal dictionary lode. But the laws which were thus adapted to the ideal vein are rarely found to fit the case of the real vein or lode with which the miners, experts, lawyers and courts have to deal.

If, for example, in a supposable case, suggested by a recent instance of instructive and significant mining litigation,[1] the vein is the filling of a fissure—which fissure may have been opened by the subterranean fissuring force in a country rock, already traversed in many directions by pre-existing and frequently intersecting structure-planes, of great number, extent and variety, along which structure-planes, as lines or planes of least resistance, the fissuring process was most readily effected, opening the way for the subsequent filling and formation of the vein within the fissure, which may have sometimes traversed the country rock directly and sometimes followed, with more or less interruption, the pre-existing and intersecting structure-planes—Query: (1) Is the vein or lode to which the courts must apply the existing law, the filling of the above-described fissure, with its dips, spurs, angles and variations in depth, and with its own individual and appropriate apex at its top? or (2) have all the pre-existing and intersecting structure-planes—along some parts of which, accidentally, the fissure and its subsequent filling have been formed—have all these structure-planes been thus made into lawful veins or lodes, of variable courses, strikes and dips, each having an independent apex of its own?

If the main fissure, vein or lode, whose unity, identity and continuity have already been established and confirmed by mineral patent, can thus be outlawed in favor of the pre-existing structure-planes, how shall the courts then determine the lawful relations of owners, claiming extralateral rights under a network, a labyrinth or a maze, of apexes?

In the recent instance referred to, on which the case here supposed is based, the structure-planes of the country rock are countless in number, infinitely varied in extent, both very small and immeasurably large, generally following more or less closely, in course and dip, the rhombic angles and angular planes of rhomboidal bodies. They strike and dip in all directions possible within the range of these structural angles, meeting and intersecting in horizontal and vertical sections, like lines of rhombic lattice or the interstitial planes within a pile of rhombohedral bricks. The surface outcrops, or alleged apexes, of these structural planes may be found traversing the patented mining claims in all possible directions. If continuous for sufficient length, they may wholly cross a claim, from side to side, converting side-lines into end-lines, at least, for that particular apparent outcrop, apex, structure-plane or vein, if a structure-plane may lawfully be the vein.

Deep down in the mine, the fissure, with its filling of rich ore, may have been formed on or along one or more of these pre-existing structure-planes, some of which may appear at the surface with an outcrop, or an alleged apex, which is found, not *within*, but outside of the exterior surface boundaries of the mining claim for which, with the vein or lode contained therein, the mineral patent has been issued. Such an outcrop, or alleged apex, if discovered within the boundaries of a neighboring patent, may thus be claimed by the neighboring owner as the true apex of the rich ore-vein known to occur in depth, as above indicated, the full possession and enjoyment of which he may claim as his own, by virtue of his extralateral right to follow to its entire depth—unlimited and far-reaching as the pub-

[1] The Pennsylvania mine, at Grass Valley, Nevada county, California.

lic domain—all veins, the tops or apexes of which are found within his boundaries.

If such a claim to the deep ore-vein in question could be maintained as lawful, it might dispossess the real owner of the vein in depth, destroy the foundation of his enterprise and industry, rob him of all the value of the property, in developing which he may have spent years of time and millions of dollars—to give it to an undermining neighbor, intruding by an alleged extralateral right, through an unsuspected loop-hole, into the premises of the original patentee, to whom the United States, years before, had already issued a patent, granting the vein or lode, the traceable outcrop of which, all within the surface boundaries of the patented claim, had long before been judicially declared to be the "top or apex" of the lode in question.

Thus interpreted, the 'Law of the Apex,' as Dr. Raymond has aptly called it, would be a severely strict application of the Scriptural law, "To him that hath (the apex) shall more be given; but from him that hath not (the apex), shall be taken away even that which he hath."

"What is the *top or apex* of a vein or lode?" is a question of vital importance, which the mining engineer is sometimes called upon to answer for the instruction of the lawyers and the enlightenment of the courts. The extralateral title of a lode-claim is controlled by the possession of the "top or apex," concerning which phrase Dr. Raymond says that these terms appeared for the first time in the Act of 1872. They were not miner's terms, and were probably used instead of the word 'outcrop,' in order to cover 'blind lodes,' which do not crop out. "The conception of an apex, which is properly a point," says Dr. Raymond, "was probably taken from the appearance of a blind lode in a cross-section, where the walls appear as lines and the upper edge as a point. We may, however, dismiss from consideration the case of a simple point and safely assume that the apex is the *same as the top*, and is either a line or a surface."

For further discussion of the subject, in the same paper, Dr. Raymond cites thirty definitions of the "top or apex," which had been received from many and various sources, more or less authoritative, as answers to an inquiry, sent in an official circular which was issued, about 25 years ago, by a Public Land Commission of the United States, for the purpose of eliciting the views of numerous mining engineers, mineral surveyors, mine owners, mining lawyers and, notably, Chief Justice Beatty, of Nevada. The definitions cited, Dr. Raymond says, "exhibit all degrees of precision and comprehension, yet neither of them is sufficiently precise and comprehensive to cover all possible cases; and nearly all practically agree in one thing, that while an apex need not be an outcrop, an outcrop must be an apex."

This final conclusion, as here stated, is not well founded in my judgment, since if the apex is the top of the lode it must, as a general rule, have linear extent, with very variable width, possibly wider than the claim, and may have scores and hundreds of outcrops, no one of which, regarded by itself alone, in most common occurrences, can be an apex, or more than a part, often an insignificant part, of an apex. The lack of a proper distinction between the top or apex and an outcrop, giving to a little accidental outcrop the full significance of a "top or apex" of the lode, has been the cause of much perplexing litigation.

It has been judicially laid down as a rule that the patented lode must cross both end-lines of the surface-claim containing it. The lode must, therefore, have length and, according to the ruling just referred to, must be as long as the patented claim. Its "top or apex" therefore cannot be a point, such as an outcrop might be, since it must have linear extent, along which there may be many outcrops.

In the language of the mineral patent, issued for a certain vein or lode, there is no mention of either the outcrop or of the "top or apex" of the lode therein specified, the possession and enjoyment of which is granted for the length described, *throughout its entire depth*, although it may enter the land adjoining. The Land Office, in issuing the patent in response to an approved application, presumes from the evidence therewith submitted that the patented claim contains the "top or apex" of the specified lode, which *in its entire depth* is thus granted to the patentee. The terms "tops or apexes" first appear in the language of the patent with reference to *other* veins, which the patentee may find within the boundary planes of his patented surface claim, all of which, *throughout their entire depth*, are likewise granted to the patentee.

It seems a reasonable supposition that when the framers of the law thus used the terms "top or apex" of the lode in such connection with *its entire depth*, that they had in mind the upper part, or top, in contradistinction from the deeper part or the bottom of the lode, which "in its entire depth" might extend thousands of feet below the surface in deep mines, underlying not only the neighboring, but the remotely distant claims in the "land adjoining," possibly miles away from the patented surface-claim containing the upper part, "the top or apex," of the lode in question. From this point of view the "top or apex" of the lode, in the meaning of the framers of the law, would be the entire body of the vein or lode, wherever it may be found inside the exterior lines of the survey, or included within the boundary planes of the patented claim produced from such exterior surface lines; and, so far as the deeper relations of the lode to the adjoining land may be concerned, the "top or apex," thus interpreted, would be substantially anywhere above and along the side-line boundary plane, where the lode in its "downward course" departs from the originally patented claim and enters "the land adjoining."

It is hardly conceivable that the framers of the law had any mental conception of its purpose and intent, substantially inconsistent or at variance with this view; and inasmuch as the law of 1872 was enacted for the purpose of simplifying, establishing and confirming an unassailable title to the rights intended to be granted thereby, it seems unreasonable that its framers could have consciously and intentionally introduced into the language of the act an enigmatic phrase or clause to obscure its true meaning and intent; and it is wholly inconceivable that they intended to propound a Sphinx-like riddle of the real or ideal lode, tending, through ambiguity, uncertainty and misapplication of terms, to confuse, unsettle and destroy the foundation and the purpose of the law.

Of all the questions herein suggested, touching the perplexing complications of end-lines and side-lines, the puzzling identity of lodes and the doubtful place of the true top or apex, the last named have perhaps been the most fruitful source of conflicting interests and bitter controversy. Some of the difficulties of the apex riddle were plainly illustrated by an expert witness on the stand in a case on trial in Colorado many years ago, who, hard pressed by critical counsel for some more definite expression of his views, replied by way of an object lesson, standing up, touching with one hand the top of his head, and saying: "If I stand upright, *here* is my apex; but," removing his hand to a conspicuously expanded waistband, "if I lie flat on my back, *where* is my apex?" But that witness's confidence in the top of his head as his apex would prove to be wholly misplaced, in the opinions of some lawyers and experts, according to whose hair-splitting definitions an apex might be found in the extreme end of each and every outcropping hair, however long, on the top of his head, all of which might, if so inclined, form a halo of outcrops, not all within the exterior limits of his side-lines or end-lines, dipping in all directions, at every conceivable angle, towards a common center beneath the surface. And if he happened to be bald-headed, would he forfeit his "top or apex," or lose his self-possession, with the loss of his hair?

Imagine a tree or a group of neighboring trees with roots descending thousands of feet into the adjoining land, the ownership of such roots, in their entire depth, being controlled by possession of their tops or apexes. Would these tops or apexes be in the *ground* where the roots centered at and about the trunk or trunks of the tree or trees? Or, would they be in the air, in the topmost branches of the tree or trees? And, if some of these topmost branches and outcropping leaves chanced to overhang the neighboring ground beyond the surface boundary of the owner of the tree or trees, would the root or roots, in their entire depth, become the possession of the owner of the ground thus overhung by the ubiquitous "top or apex" of the tree in question?

I hope that enough has been said to plainly show the important and significant relations of the United States mining law to the vocation of the American mining engineer.

VALUATION OF COMMERCIAL SULPHUR.—J. Ceruti describes (*Journal* Society of Chemical Industry, September 15, 1904) the method of leaching 1 to 2 g. of the sample on a tarred filter with 50 c.c. of aniline heated to 120°-130° C., after which the filter is washed with alcohol, dried and weighed. Sulphur may be precipitated from the filtrate by cooling, and neutralizing with chlorhydric acid.

LITHOPHONE.—J. Gibaud and O. Bang state, in French patent 341,539, March 25, 1904, that calcium sulphate, calcium carbonate, magnesium oxide, or magnesium carbonate do not diminish the covering power of zinc sulphide, and even increase that of lithophone. It is proposed, therefore, to prepare a pigment by adding a solution of zinc sulphate to a solution of calcium chloride, then adding a solution of an alkali sulphide, or barium sulphide, and calcining the precipitate.

RETORT COKE-OVENS.—The number of retort, or by-product coke-ovens in the United States at the close of 1903 was 1,956, an increase of 293 during the year. The number under construction at the same time was 1,335, of which 1,128 are in the large plant of the Lackawanna Steel Company at Buffalo, N. Y. This will bring the total up to 3,291 ovens. The number of beehive coke-ovens at the end of 1903 was 75,232, with 4,940 building.

THE HUNTINGTON-HEBERLEIN PROCESS.

By Donald Clare.

The process was patented in 1897, and is based on the fact that galena can be desulphurized by mixing it with lime and blowing a current of air through the mixture. If the temperature is dull red at the start, no additional source of heat is necessary because the reaction causes a great rise in temperature. The chemistry of the process cannot be said at present to have been worked out in detail. The patentees found that by mixing lime and galena together and heating in air to 700° C. and then allowing to cool to a dull red heat, that oxygen was given off, sulphur dioxide being simultaneously evolved. At this point, if air is forced through the mixture, the temperature rises and the operation becomes continuous, the oxygen acting on the galena as long as any sulphur dioxide remains in the mixture. Concentrated fumes of sulphur dioxide are given off and the mixture gradually oxidizes rapidly to sulphite, then to sulphate, then reacts with lead oxide giving calcium plumbate and sulphur dioxide

$$CaSO_4 + PbO = CaPbO_3 + SO_2.$$

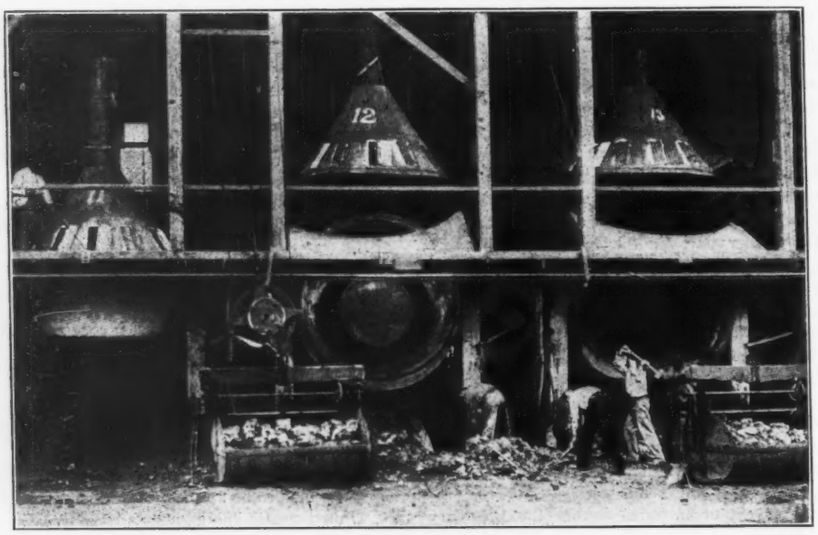
Further, calcium sulphate will also react with galena, giving calcium sulphide and lead sulphate; the calcium sulphide is oxidized, by air blown through, to calcium sulphate again, the ultimate reaction being

$$CaSO_4 + PbS + O = CaPbO_3 + SO_2.$$

In all cases the action is oxidizing and desulphurizing. It was found that oxides of iron and manganese will, to a certain extent, serve the same purpose as lime and on application to complex ores, especially those containing much blende, that these may be desulphurized as well as galena. In the case of zinc sulphide the decomposition is probably due to the interaction of sulphide and sulphate.

$$ZnS + 3ZnSO_4 = 4ZnO + 4SO_2.$$

The process has now been adopted by the Broken Hill Proprietary Company at their



HUNTINGTON-HEBERLEIN PROCESS.

fuses to a mass of lead oxide in conjunction with the gangue of the ore treated. The reactions provisionally given by patentees were:

(1) At 700° C. $CaO + O = CaO_2$.

(2) At 500° C. $4CaO_2 + PbS = PbSO_4 + 4CaO$.

Combining (1) and (2). $4CaO + PbS + 4O = PbSO_4 + 4CaO$.

In other words, lime heated to 700° C. absorbs oxygen and becomes dioxide, which reverts to lime again on cooling, but if lead sulphide is present this is attacked and converted into sulphate. After the change it was held that, at the temperature attained due to these reactions, lead sulphide reacts with lead sulphate, giving lead oxide and sulphur dioxide.

(3) $PbS + 3PbSO_4 = 4PbO + 4SO_2$.

These reactions, given by the patentee, are not satisfactory, since calcium dioxide only is formed at low temperatures and is readily decomposed on gently warming it; lead oxide, however, combines with oxygen under suitable conditions at a temperature not exceeding 450° C. and forms a higher oxide, and it is probable that this unites with the lime to form calcium plumbate. The reaction between sulphides and lime when intimately mixed and heated may be put down as

$$CaO + PbS = CaS + PbO.$$

In contact with the air the calcium sulphide works at Port Pirie, the Tasmanian Smelting Company, Zeehan, the Fremantle Smelting Works, West Australia, and the Sulphide Corporation's works at Cockle Creek, New South Wales. The operations carried on at the Tasmania Smelting works, comprises mixing pulverized limestone, galena and slag-making materials and introducing the mixture either into hand-rabbled reverberatories or mechanical furnaces with rotating hearths. After a roast, during which the materials have become well mixed and most of the limestone converted into sulphate and about half of the sulphur expelled, the granular product is run while still hot into the Huntington-Heberlein converters. These consist of inverted sheet-iron cones, hung on trunnions, the diameter being 5 ft. 6 in. and the depth 5 ft. A perforated plate or colander is placed as a diaphragm across the apex of the cone, the small conical space below serving as a wind box into which compressed air is forced. A hood above the converter serves to carry away waste gases. As soon as the vessel is filled, air under a pressure of 17 oz. is forced through the mass, which rapidly warms up, giving off sulphur dioxide abundantly. The temperature rises and the mixture fuses, and in from two to four hours the action is complete. The sulphur is reduced from 10 to 1 per cent, and the whole mass is fritted and fused together. The converter is emptied by inverting it, when the sintered mass falls out and is broken up and sent to the smelters. There are 12 converters, of the size indicated, for the two mechanical furnaces, of 15 ft. diameter. Larger converters of the same type were erected to deal with the product from the hand-rabbled roasters.

At Cockle Creek, New South Wales, the galena concentrate is reduced to 1.5 mm., more than 60 per cent of the material being finer; the limestone is crushed down to from 10 to 16 mesh, silica is also added, if it does not exist in the ore, so that, excluding the lead, the rest of the bases will be in such proportion as to form a slag running about 20 per cent silica. The mixture may contain from 25 to 50 per cent lead, and from 6 to 9 per cent lime; if too much lime is added the final product is powdery, instead of being in a fused condition. This is given a preliminary roast in a Godfrey calciner. This furnace has a rotating bed and a low dome-shaped roof. Ore is fed through a hopper at the center, and deflected outward by blades attached to a fixed radial arm. At each revolution the ore is turned over and moved outward, the amount of deflection of the blades, which are adjustable, and rate of rotation of the bed, determining the output. The furnace for supplying the hot air is placed at one side, and the gases are made to travel over the ore escaping from the furnace to that entering, before leaving by a flue. A constant stream of hot semi-roasted ore is discharged through a slot at the circumference of the roaster. This may contain from 12 to 6.5 per cent of sulphur, but from 6.5 to 8 per cent is held to be the most suitable quantity for the subsequent operations. Thorough mixing is of the utmost importance, for if this is not done the mass will 'volcano' in the converter, that is, channels will form in the mass through which the gases will escape, leaving lumps of untouched material alongside. The action can be started if a little red-hot ore is run into the converter and cold ore placed above it; the whole mass will become heated up, and the products will fuse, and sinter into a homogeneous mass showing none of the original ingredients. At Cockle Creek the time taken is stated to be five hours; a small air-pressure is turned on at first, and ultimately it is increased up to 20 ounces.

Operations at Port Pirie are conducted on a much larger scale. A mixture of pulverized galena, powdery limestone, ironstone and sand is fed into Ropp furnaces, of which there are five, by means of a fluted roll placed at the base of a hopper. Each roaster deals with 100 tons of the mixture in 24 hours. About 50 per cent of the sulphur is eliminated from the ore by the Ropps (the galena in this case being admixed with a large amount of blende, there being only 55 per cent of lead and 10 per cent of zinc in the concentrate produced at the Proprietary mine). The hot sand from the roasters is trucked to the converters, there being 17 of these ranged in line. The converters here are large segmental cast-iron pots hung on trunnions; each is about 8 ft. diam. and 6 ft. deep, and holds an 8-ton charge. At about two feet from the bottom an annular perforated plate fits horizontally; a shallow frustrum of a cone, also perforated, rests on this; while a plate with a few perforations closes the top of the frustrum. The whole serves as a wind box. A conical hood with flanged edges rests on the flanged edges of the converter, giving a close joint. This hood is provided with doors

which allow the charge to be barred if necessary. A pipe about 1 ft. 9 in. diam., fitted with a telescopic sliding arrangement, allows for the raising or lowering of the hood by block and tackle, and thus enables the converter to be tilted up and its products emptied. The cast-iron pots stand very well; they crack sometimes but they can be patched up with an iron strap and rivets, only two pots have been lost in 18 months.

Air enters at a pressure of about 24 oz. and the time taken for conversion is about four hours. The sulphur contents are reduced to about three per cent. It is found that the top of the charge is not so well converted as the interior. There is practically no loss of lead or silver due to volatilization and very little due to escape of zinc. It has also been found that practically all the limestone fed into the Ropp is converted into calcium sulphate; also that a considerable portion of lead becomes sulphate, and it is considered that lead sulphate is as necessary for the process as galena. The value of the process may be judged from the fact that better work is now done with 8.5-ft. furnaces than was done with 13-ft. before the process was adopted.

In addition to the sintered product from the Huntington-Heberlein pots, sintered slime, obtained by heap roasting, and flux consisting of limestone and ironstone are fed into the furnaces, which take 2,000 long tons per day of ore, fluxes, and fuel. The slags now being produced average: SiO_2, 25 to 26 per cent; FeO, 1 to 3 per cent; MnO, 5 to 5.5; CaO, 15.5 to 17; ZnO, 13; Al_2O_3, 6.5; S, 3 to 4; Pb, by wet assay, 1.2 to 1.5 per cent; and Ag, 0.7 oz. per ton. Although this comparatively large quantity of sulphur remains, yet no matte is formed.

A BRITISH STEEL AGREEMENT.—Negotiations are pending for an agreement intended to stop the excessive competition which has existed between the Scotch steel works and those of the North of England. A preliminary agreement has been drawn up by a committee, and is to be submitted to the various companies.

ELECTRICITY IN FRENCH STEEL WORKS.—In the new basic bessemer plant recently erected by the Chatillon-Commentry Company at Neuves Maisons, France, the entire manipulation of the ladle, both for charging and casting, is effected by overhead traveling cranes worked by electric motors. The shop is planned to contain four 18-ton converters and two gas-heated mixers, each of 220 tons capacity.

ZINC WHITE *vs.* WHITE LEAD.—E. Lenoble reports (*Bulletin* Société d' Encouragement, 1904, CVI, 513-537; *Journal* Society of Chemical Industry, August 31, 1904, p. 829) that when Dutch-process white lead and Vieille Montagne zinc-white are mixed with equal proportions of vehicle (oil and turpentine) seven parts by weight of white lead are required to give the same degree of opacity as five parts of zinc-white. In practice, however, zinc-white requires a much larger proportion of vehicle than white lead, wherefore when two coats of equal thickness of the two paints are applied (containing the proportions of vehicle which render them applicable with equal facility) it is necessary to put on four coats of zinc-white to obtain the same opacity as by three coats of white lead.

GRAHAM ISLAND COAL.

By William Blakemore.

The impending exhaustion of the coal mines operated for more than thirty years on Vancouver island by the Dunsmuir family and the New Vancouver Coal Company lends additional interest to the recent exploiting of the Graham island deposits, because they represent the only coal capable of replacing them at the present time.

Attention was first directed to these deposits by the annual reports of the Mines Department. Thus, in the report for 1887, we find it stated that "on the Yakoun river, about midway between Skidegate and the head of Massey inlet, a discovery has lately been made of bituminous coal of excellent quality."

The Government report proceeds to give the following analysis by M. Hoffman of the Geological Department, Ottawa: Hygroscopic water, 2.65 per cent; volatile combustible matter, 30.59; fixed carbon, 61.33; and ash, 5.43 per cent. This is from the large seam at Camp Wilson.

It will be well to make clear the exact locality of the deposits. Graham island is the most northerly of the Queen Charlotte group, situated on the northwest coast of British Columbia, between 131° and 133° 30′ west longitude, and 52° and 54° 30′ north latitude. It is in the track of the Oriental steamships, and for navigable purposes may be considered nearer to San Francisco than Nanaimo on Vancouver island, inasmuch as the latter is on an inland sound. The coal measures extend—as already proved—a distance of 14 miles through the Yakoun valley, and underlie about 30,000 acres. The work is distributed as follows: Six miles from Skidegate inlet a seam of anthracite has been proved. On it a shaft has been sunk 40 ft. and an entry driven 42 ft. Eight miles from Skidegate inlet is Camp Robertson. Here is an entry 180 ft. cutting across two seams of coal, an incline 14 ft. on coal, a shaft 22 ft. deep, and a cross-cut opening a bed (called No. 1), 19 ft. in thickness. This seam is vertical, and on being tested was found to be a fine coking coal. The analysis gave: Moisture, 3.04 per cent; fixed carbon, 57.23; volatile combustible matter, 33.33; and ash, 6.40 per cent. No. 2 seam cut in the entry is similar in quality to No. 1 and 14 ft. thick. The seam of anthracite above mentioned was proved in an entry driven 40 ft. where the seam was 10 ft. thick. The dip decreases from vertical at the surface to 45° at the bottom. At one point in the 'tunnel' it attains 16 ft. in thickness. The analysis gave: Moisture, 2.14 per cent; fixed carbon, 93.72; volatile combustible matter, 0.78; and ash, 3.36 per cent.

Probably the most valuable seams have been proved at Camp Wilson, nine miles north of Camp Robinson. Here the first seam disclosed is a high-grade bituminous coal 13 ft. thick at the surface and 17 ft. in the 'tunnel,' 14 ft. of this being clear coal absolutely free from impurities. At the face the dip was only 60°, the strike continuing, as with all the seams, north and south. This is a free-burning bituminous coal of high grade; it burns with a clear flame, leaving little ash. Analysis gave: Moisture, 2.80 per cent; fixed carbon, 62.10; volatile combustible matter, 30.20; and ash, 4.90 per cent. Judging from the condition of the exposures and the flattening of the seams, there is reason to expect that at a short distance from the surface the dip will be easy and the measures unbroken. This property is well to the east of the volcanic disturbances which have disrupted the measures on the southeast shore of Skidegate inlet and along the west coast of the island. This view as to the existence of a wide basin of undisturbed coal at a moderate dip is confirmed by observations made at several points on the surface, where the formation had been eroded, and also in the 'tunnel' at Camp Robertson. In every instance the coal seams are found in sandstone of the lower Cretaceous formation.

About a mile to the northeast of this property lignites make their appearance, bearing out the statement of the late Dr. G. M. Dawson when he said that "Tertiary rocks holding lignite form a large portion of the northern end of Queen Charlotte island." From the great thickness of the bituminous coal-bearing sandstones in the interior, they must lie at such a depth on the north and east coasts as to be unworkable. It is evident that the eruptive forces on the mountain range of the west coast have raised the measures, breaking them up in the mountains, but bringing them near the surface in the basin lying between the ranges, exactly as is the case with the famous Crow's nest Pass deposits, where the basin is at most eight miles wide and 40 miles long. As the strike of the Yakoun valley measures is north and south, and parallel with the line of disruptive force, there is little doubt of their continuance throughout this valley. The topography of the island is favorable for railroad construction, and several low passes are available if a road should be built over the mountain range to the west coast, for shipment to the Orient. There is a lake six miles long and a mile wide near the property, and abundance of timber, mainly spruce, cedar and hemlock.

If, as seems probable, Skidegate inlet is selected as the shipping point, the coal could be taken by rail about seven miles from Camp Robertson to docks built on the south side of Lina island. A road to the west coast 14 miles in length would terminate at Yakoun bay, Rennel's sound. Its highest point would be 600 ft. above tide. Yakoun bay is a natural harbor, two miles long and one wide. It is at the head of Rennel's sound and is completely landlocked, with deep water at all tides.

These deposits are little known, not having attracted public interest, but the force of circumstances will soon bring them to the front. They contain, as the analyses show, anthracite, steam, coking and domestic coals of high quality, far superior, in fact, to any yet worked on the Pacific coast. The government engineers estimate that within ten years the existing mines will be worked out; before then the Graham island coals certainly will be developed. For many years past the Vaucouver island mines have produced upward of 1,000,000 tons per annum, two-thirds of which has been shipped to California. This trade increases in spite of the competition of Texas oil and New Mexico lignite, the latter running from 20 to 30 per cent ash. In none of the western States has a clean bituminous coal been discovered near enough to the coast to compete with this coal. But there is little doubt that, apart from the growing demand for high-class coal in the West, for the Canadian and American markets, there shortly will be a still larger demand from the Orient. Japanese coals are low grade. They have no first-class smelting fuel. The coals of Shansi province in the Chinese hinterland are too far from tide-water to compete, and among the produce which must in the natural order of things go to swell trade returns with Japan in the near future is Graham island coal.

IRON DEPOSITS OF THE CHUPADERA MESA.

By Charles R. Keyes.

Thirty miles east of the Rio Grande in central New Mexico, and slightly north of east from Socorro, there are some recently-discovered iron deposits of considerable extent and importance. They are remarkable on account of the geological conditions under which they were formed, and the singular circumstances by which they have become exposed to view.

These iron deposits are at present situated at a distance from adequate transportation facilities, but this drawback to development promises to be removed by the construction of the newly-surveyed line of the Santa Fe Central railroad to El Paso. When this railroad is completed the region may prove an important factor in the iron industry of the Southwest.

The surface relief of the district is quite anomalous. The Chupadera mesa is a broad plain, with descending cliff-like borders. It stands 300 ft. above another wide plain, which is the general datum level of central New Mexico. The substructure is of inclined limestones of Carboniferous age and Cretaceous sandstones, which are beveled by the mesa surface. The margins of the mesa are deeply dissected on all sides by ramifying cañons, which are often of considerable width and flat-bottomed. It is in these cañons that the iron ore is exposed. The outcrops occur along long straight ridges which stand up conspicuously.

In the immediate neighborhood of the deposits, the geological formation consists of flat-lying Cretaceous sandstones, which in near-by hills have a thickness of more than 800 ft. These constitute the main surface rocks for many miles about. Traversing the country is a series of huge trachyte dikes 100 to 250 ft. thick and ten to a dozen miles in length. These dikes nowhere cut the Cretaceous sandstones, only the Carboniferous limestones. Wherever the Cretaceous covers the Carboniferous at the dike intersections it remains unbroken. Careful examination shows clearly that the Cretaceous rests with marked unconformity upon the older strata, and this has been demonstrated recently beyond all doubt to be the case in other parts of central New Mexico. A long interval therefore separates the time when the dikes broke through the Carboniferous and the period when the Cretaceous sands were laid down. Moreover, this interval was an erosive period, when the Carboniferous rocks cut by dikes were part of a land area which suffered profound denudation, beveling all the indurated strata of the time.

In the immediate vicinity of the dikes the clastic rocks are much disturbed. The Carboniferous limestones, which normally lie at least 1,000 ft. below the Cretaceous sandstones, are here brought to the surface and stand at high angles. The accompanying cross-section illustrates more clearly the relationships.

These limestones form a belt several hundred feet wide, on either side of the dikes, before becoming lost to view under the sandstones of the cañon walls.

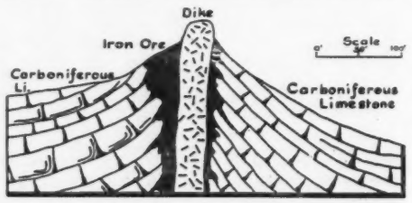
The orebodies have formed along the sides of the dikes, being deposited between the eruptive plate and the broken margins of the limestones. As the fractured limestone has ragged edges, the spaces occupied by the iron are irregular. This disposition is represented in my drawing by the black irregular patches bordering the dike-rock.

The ore is largely hematite and magnetite. Much of it is pure. The width of the orebodies is variable. Most of them are not more than a dozen feet wide. The depth to which they go is as yet undetermined. Shafts already sunk show the ore down to 100 feet.

The origin of these iron deposits is of exceptional interest. The explanation commonly held is that the deposits are eruptive in character, and were formed at the time the trachyte dikes were intruded. This is easily proved to be quite erroneous.

The real genesis of the deposits is not at once suggested. A careful consideration of the geological features of the region puts the whole matter in a different light. The entire series of deposits has originated much in the same way as the specular iron deposits of Missouri, so clearly brought out by Nason. It has been by infiltration in porous and cavernous spaces in the shattered zone of the limestone, the dike forming one wall.

It has been stated that the dikes do not cut the sandstones, and that a marked unconformity exists at the base of the Cretaceous. During the interval represented by the unconformity many hundreds of feet of the dike and adjoining limestones were decomposed and the



SECTION, SHOWING DIKE.

more soluble materials carried away. Both the limestones and the dike-rock are rich in iron, and this material was allowed to settle down, filling all of the crevices and shattered zones bordering the eruptive rock.

The only difference between the Missouri deposits and the New Mexico deposits is that in the case of the last-mentioned the orebodies, after being formed under subaerial conditions, were covered up and hermetically sealed as long ago as the Cretaceous period. Only very recently were they exhumed accidentally by the agencies of erosion. To-day the deposits are practically in the same condition as they were at the beginning of the Cretaceous, having been preserved perfectly intact during the long interval intervening.

THE STONE INDUSTRY.—The figures collected by the Geological Survey put the value of the stone quarried in the United States in 1903 at $73,384,200, an increase of $3,553,649 over 1903, in spite of troubles in the building trades. The values of the different kinds of stone given are:

	1902.	1903.	Changes.
Granite	$16,076,787	$15,703,793 D.	$372,994
Trap rock	2,181,157	2,732,294 I.	551,137
Sandstone	9,437,646	9,482,802 I.	45,156
Blue stone	1,163,525	1,779,457 I.	615,932
Marble	5,044,182	5,362,686 I.	318,504
Limestone for bld'g	24,959,751	26,642,551 I.	1,682,800
Limestone for flux	5,271,252	5,423,732 I.	152,480
Slate	5,696,051	6,256,885 I.	560,834

Pennsylvania surpassed all other States in the product of its quarries during 1903. The value of its stone amounted to $13,913,220. Second on the list is Vermont, with a value of $6,605,060. New York is third, with a stone product valued at $5,742,833, and Ohio is fourth, with a product worth $5,114,051. The production of every other State was considerably less.

ORE TREATMENT AT THE IVANHOE MINE, KALGOORLIE.

By H. J. Brooke.

The plant of the Ivanhoe mine embraces all the successful methods at present in vogue at Kalgoorlie, namely, wet crushing in battery, concentrating, leaching sand in vats, bromo-cyanide, filter-pressing of slime, roasting and cyaniding of concentrate, dry-crushing in ball-mills and roasting of telluride ore.

The ore consists of a mixture of quartz and schist containing about 6 per cent sulphides, chiefly iron pyrite. In the north end of the mine there is a small amount of telluride, which is treated separately from the main bulk of the ore.

The output of the mine is raised from the main shaft in 2.5-ton skips, which deliver onto grizzlies with bars two inches apart and 12 ft. long. The fine passes through these into a bin and the coarse runs into a No. 7 rock-breaker having a capacity of 90 tons per hour. This crusher reduces the ore to pass a 3-in. ring, and delivers it onto grizzlies similar to the first series. The fine runs into bins and the coarse into two No. 5 breakers, which reduce the ore to pass a 2-in. ring. All the ore is thus made to pass through a 2-in. ring. The bin into which these three rock-breakers deliver has a capacity of 400 tons, and is rectangular in shape, with the sides sloping together at the bottom.

The four discharge doors deliver into four Challenge feeders, which pass the ore to an 18-in. belt-conveyor. This belt handles about 100 tons per hour, and is driven off the main shafting; it delivers to another belt, which carries the product to the mill-bins. There are two traveling automatic distributors, which move up and down the whole length of the bins and spread the ore evenly throughout. These bins have flat bottoms and a capacity of 1,630 tons (of 2,000 lb.), of which 800 tons is live ore (ore that will discharge itself). The bins deliver from 20 chutes into a like number of Challenge feeders.

The mill consists of 100 stamps, each weighing 1,100 lb., and dropping 96 times per minute, with an 8-in. drop; the duty is 5.2 tons per stamp per 24 hours. The ore is crushed through a 20-mesh wire or its equivalent in punched screens. Inside amalgamation is adopted and amalgamated copper splash-plates are hung outside; these receive the pulp as it is discharged. The usual apron plates and copper plates follow. The pulp, consisting of 65 per cent sand and 35 per cent slime, runs from the copper tables into spitzkasten, one to each ten stamps. These divide the sand into fine and coarse, which run onto fine and coarse Wilfley tables respectively; of these there are 20, running at a speed of 230 strokes per minute. The average amount of concentrate saved on these tables is about 25 tons per day. The concentrate is discharged from the tables into launders, which deliver into a 7-in. plunger pump for removal to the roasting annex.

The coarse sand from one set of tables runs into 10 Wheeler grinding pans, while the fine sand from the others goes direct to the main launder at the foot of the mill. The pans just mentioned have a 5-ft. diameter; they run at a speed of 56 rev. per min., and after reducing the coarse sand they deliver it onto another set of 10 Wilfleys, where the mineral set free by grinding is caught. The last lot of tables run at 220 rev. per min., and catch about six tons of concentrate per day. This concentrate runs into the pump along with the 25 tons caught by

the first 20 Wilfleys. Compensator weights are added to the pans, as the shoes wear rapidly, and mercury is added to catch any fine gold liberated by grinding. The sand from these pans and tables runs into the main launder. The pulp as it finally leaves the mill consists of about 50 per cent slime, the 50 per cent of sand being in a fine state of subdivision. The water, sand and slime from the entire 100-stamp mill runs into a double-plunger tailing-pump, which lifts 65 ft. into the distributor vats of the cyanide plant, where the sand settles and the slime runs off through slats to settlers.

The cyanide plant for leaching sand consists of 14 top-distributor vats 20-ft. diam. by 6.5 ft. deep, and 14 bottom vats 22 ft. diam., also 6.5 ft. deep. When the first vats are full of sand they are allowed to drain and are then leveled off, after which about 18 tons of a 0.2 per cent cyanide solution is pumped into them. At the end of four days the pulp is emptied into bottom vats, where it is subjected to another 18 tons of 0.2 per cent solution, and about 40 tons 0.1 per cent solution. The total time of treatment is 10 days. The slime and water beforementioned runs off from the vats into large spitzkasten, which separate the sand escaping from vats through leaky slats and send it back to a tailing-pump to be returned. The big bulk of slime and water flows into large rectangular settlers, and the clear water runs into a double-plunger pump, and is pumped back to the mill to be reused. The slime in the settlers empties through valves in the bottom, runs into a plunger pump, and is lifted up into agitators.

The slime plant proper consists of eight agitator vats 20 ft. diam. and 8 ft. deep, capacity 100 tons, in each of which is a four-armed angle-iron agitator which keeps the thick pulp moving slowly; 80 lb. cyanide is added to each vat and extracts 66 per cent gold. A few hours after 30 lb. bromo-cyanide is added, which extracts a further 20 per cent gold, and six hours after the addition of bromo-cyanide the slime is discharged through a 6-in. valve in bottom of agitator into filter-presses. These consist of six 2-in. cake and two 3-in. cake presses; they have a capacity of 10,000 tons per month and discharge into trucks underneath. The whole of the slime plant is driven by a 40-h.p. electric motor.

The roasting equipment consists of two ball-mills, four Edwards furnaces and three grinding pans. The concentrate which comes from the Wilfley tables is pumped up into four settling vats with filter bottoms erected over the furnaces. When one vat is full it is allowed to drain and is then discharged onto a floor. The discharge is fed into three furnaces, which have a capacity each of 10 tons per day. The telluride ore, which is also treated in this plant, goes through a No. 2 breaker, a No. 4 Krupp ball-mill, and is then elevated into a bin and fed into the fourth furnace. All the roasted product (both telluride ore and concentrate) discharges into three grinding pans, the free gold is amalgamated therein, and the roasted pulp runs into a pump, and is lifted into a series of spitzkasten placed over two agitator-vats at the slime plant. The thick slime from these spitzkasten runs into an agitator, while the clear water at overflow gravitates back to the furnaces and is reused. The roasted slime is agitated 48 hours with cyanide and is then filter-pressed like the raw slime in the usual way.

All the residues from vats and presses are dumped into trucks and are hauled out by an electric locomotive (capable of taking 20 tons at each load) onto a large circular dump.

The clean-up room contains nine zinc boxes, which are cleaned up twice per month. The gold slime is treated with sulphuric acid and filter-pressed, then taken to smelting rooms, roasted in two iron muffles, and melted down in two large tilting furnaces. The gold from these is then run into 500-oz. bars, sampled, and is ready for the bank.

On ore containing 15 dwt. the residues show a loss of 2 dwt., or an extraction of nearly 87 per cent.

The sand shows a loss of	2.5 dwt
The slime shows a loss of	1.5 "
The concentrate shows a loss of	2.5 "
The telluride ore shows a loss of	2.0 "

The gold won is obtained as follows:

Mill and pans recover	30 per cent
Sand recovers	18 "
Slime recovers	25 "
Concentrate recovers	23 "
Telluride ore recovers	4 "
	100 "

On a tonnage of 16,000 per month the cost of treatment by the above plant is about 9.5 shillings or $2.28 per ton, which includes all charges from the time the ore is tipped into the rock-breakers to dumping out residues.

THE MAITLAND MILL, SOUTH DAKOTA.*

By JOHN GROSS.

The group of claims situated at Maitland (formerly known as Garden City), in the Ida Gray mining district, Lawrence county, South Dakota, are now being developed and operated by Alexander Maitland, the owner. Prior to the acquisition of this property two years ago by Mr. Maitland but little work had been done in this district, and little was known of the extent of the ore deposits. Recent development, however, has opened up some very promising oreshoots.

The ores so far encountered are the so-called 'Potsdam silicious ores,' occurring in the flat formation immediately above the Cambrian quartzite, which dips at this locality about 12°. Both oxidized and blue ores are found, and the latter have proven particularly refractory to treat. No prospecting in the underlying Archean slates has so far been attempted; but this work is one of the future considerations in the development of the property.

Small quantities of blue ores are unavoidably sent to the mill, but special care is taken to avoid this as much as possible. The ores, being close-grained and hard, have given considerable trouble in their treatment. Pyrrhotite and iron pyrite exist in about equal proportions; arsenic, copper, and traces of antimony and tellurium are found, and considerable quantities of bismuth have been found in the zinc-box precipitates. The silver in the low-grade ores is slightly greater than the gold, while in the high-grade ores the reverse is generally true.

Early in 1902 the building of a 40-stamp wet-crushing cyanide-mill was begun, and it was finally placed in commission by January 1, 1903. The treatment, briefly, was to crush the ores in a cyanide solution (as practiced at several of the local mills, and originated and brought to a high degree of perfection at the large mills in New Zealand), to separate the sand and slime, to leach the sand, and to treat the slime by agitation and decantation.

The ore as it comes from the mine, carrying an average of 8 per cent moisture, is delivered to the crusher-bin of 150 tons capacity. The crusher-bin has a flat bottom, and is 22 ft. long, 10 ft. wide and 12.5 ft. deep, having a capacity of 2,750 cu. ft.; the inside is lined with double planking, and is protected at the points most exposed to wear by 0.25-in. steel plates. Upon the assumption that the ore will form its own slope, the idea of using a rectangular-shaped bin, in place of one having a bottom sloping to the discharge, seems, at first glance, to be economical, but this form is not as practicable as the 45° sloping-bin, which practically discharges the ore clean. It is true that wet ore forms its own slope, but this slope is so steep that the working capacity of the bin is reduced to a very low point of efficiency. The ore for the breaker is passed directly from the bin to the breaker, no grizzly being intermediate; it is contemplated, however, to install a grizzly, not only to shorten the actual running time of the breaker, but as a beneficial aid in breaking very wet ores.

The breaker is a 24 by 13 in. Blake, running at 260 revolutions per minute, and set to break to a size that will pass through a 1.5 to 2-in. ring. The average time of running is 7 hours per day, which gives a capacity of from 16 to 17 tons per hour. A set of jaw-plates in the breaker lasted 15 months, during which time 41,000 tons of ore were broken.

The crushed ore is passed through iron-lined chutes to the elevator-boot, and is elevated 44 ft. for delivery to the battery-bins. In the original mill a bucket elevator of the continuous type, traveling 100 ft. per minute, was provided; but was soon discarded after handling 9,300 tons of ore, for the reason that the links wore out and caused it to fall into the pit on several occasions. A 14-in., 8-ply rubber belt is now used, traveling 350-ft. per minute; and, in order to lengthen its life, it is re-inforced between the buckets with old pieces of belt, which take the roughest wear. One belt has so far been worn out after having handled 16,965 tons of ore at a cost of 0.19c. per ton. The first rubber-belt elevator received extremely hard usage during the first few months of its service, the second one, now in place, has handled a larger tonnage and is still in good condition.

The 12-in. buckets are spaced 18 in. apart on the belt. No. 10 sheet-steel buckets were first used, and handled 16,965 tons of ore at a cost of 0.45c. per ton. Malleable-iron buckets proved too light for the work and handled 8,080 tons of ore at a cost of 0.76c. per ton. No. 6 sheet-steel buckets are now used, and the tendency is to use still heavier ones.

The two battery-bins, each of 150 tons capacity, are situated one behind each set of 20 stamps. The ore falls through chutes to suspended Challenge feeders, one for each battery of five stamps. The mortar is narrow, of single discharge type, 12 in. wide at discharge, and a 6-in. discharge is maintained, crushing the ore to 30-mesh size. No. 28 wire screens were originally used, but they have now being replaced by 26 by 13 mesh, No. 26 wire screen, which gives a longer opening that does not clog so readily. The screens used are also rolled, which helps to keep the holes open. The life of the screens now installed is about 50 days. Two sizes of screen-frames are used, the larger size taking a 12-in. clear height of screen; and, after it has become worn at the top and bottom, it is removed, cut down and placed on the smaller frame, taking an 8-in. clear height of screen. This arrange-

* Abstracted from an article read before the Lake Superior meeting of the American Institute of Mining Engineers. Proofs not revised by author.

ment increases the life of the screen almost one-half.

The battery solution is kept at a strength of from 1.2 to 1.3 lb. of KCN and a protective alkalinity corresponding to 0.8 to 1 lb. of NaOH per ton of solution. Two solutions only are used in the mill, the battery solution as noted above assaying about 50c. in gold per ton, and the barren solution with a strength of from 1.5 to 1.6 lb. KCN and a protective equivalent of from 1.0 to 1.2 lb. of NaOH per ton of solution.

The weights of the various parts of a new stamp are: Shoe, 150; boss-head, 250; stem, 375; tappet, 135; total, 910 lb. Ten cams with Canda fasteners are on one shaft; the camshafts revolve in babbitted boxes without caps, which simplifies the re-babbitting and lubrication. The stamps drop 97 times per minute through from 7 to 8 in. distance, the order of drop being 1, 3, 5, 2, 4. At present, chrome steel shoes and dies are mainly used, but other materials also have been used both in practice and for experiment. The results of the work of the shoes and dies during a period of 10 months are as follows:

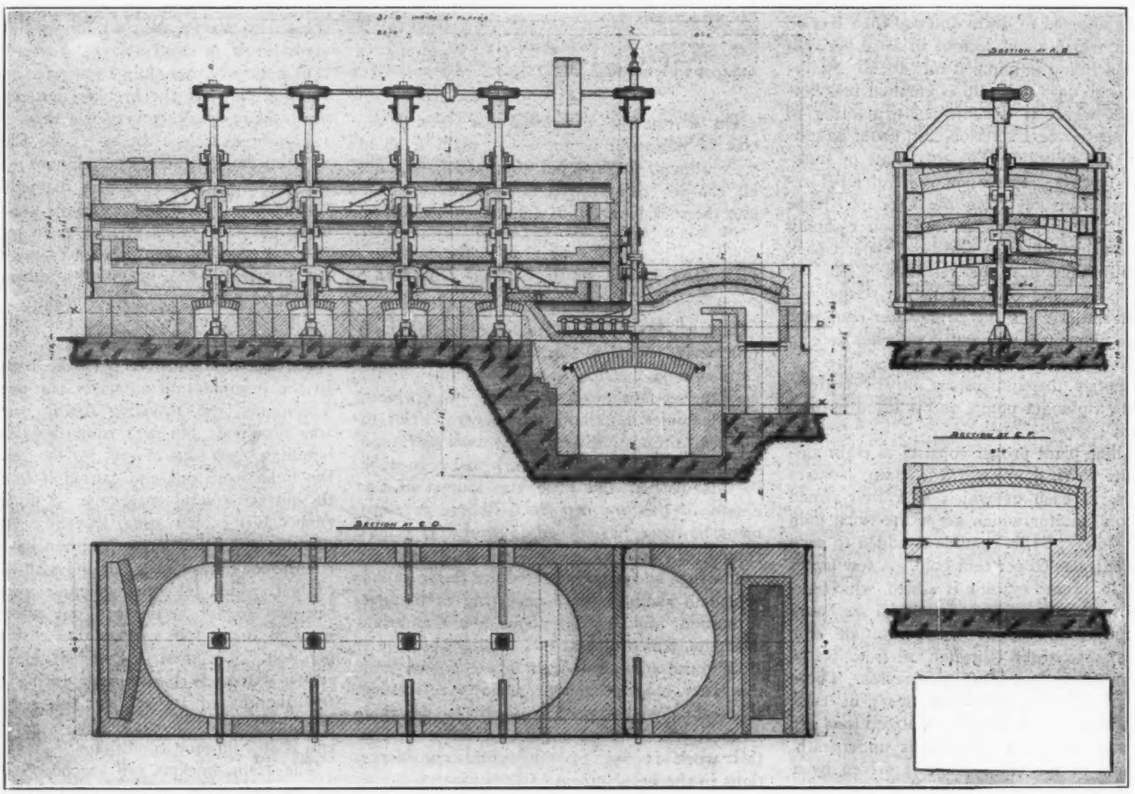
	Length of Life. Days.	Quantity Crushed. Tons.	Cost per Ton of Ore. Cents.
Chrome shoes	90–95	250	4.46
Cast shoes	35–40	105	4.95
Chrome dies	90	240	2.90
Wilson dies	100	270	3.03
Cast dies	35	100	3.28

The stamp duty per ton is not high, averaging 2.66 tons during the latter six months of 1903, and 2.80 tons for the first five months of 1904. During May, 1904, the stamp duty was increased to 2.96 tons per day. The quantity of solution going to the battery is between 4 and 5 tons to 1 ton of ore, which, in connection with the hardness and compactness of the ore, accounts largely for the small stamp duty.

The stamps deliver a product carrying about 60 per cent of sand and 40 per cent of slime, the latter being that portion of the ore the addition of which to water will render it muddy. Sand, no matter how fine, leaves the water clear; and, because of this sharp line of distinction, the separation of these two products in the laboratory can be made easily in a gold pan.

A CALIFORNIA CHLORINATION PLANT.

A new chlorination plant which has some points of interest has been installed recently at Hodson, California, by the Union Iron Works, of San Francisco. The chief feature of the plant is the use of the roasting furnace designed by Mr. T. B. Merton, of Melbourne, Victoria. This furnace is shown in section in the accompanying engraving.



MERTON ROASTING FURNACE.

This furnace is 32 ft. long by about 9 ft. wide over all, and has three decks, one above the other, in each of which are four rabble arms revolving in circles, and stirring the sulphuret or ore, carrying it from end to end of the hearth into a series of piles resembling the letter S. At the end of each hearth is a slot connecting to the hearth below; through this the ore discharges to the hearth next beneath, and is carried by another series of rabbles to the opposite end. Again, it is discharged to the third hearth, and travels along it toward the finishing hearth. Near the end of the third hearth is another slot, in which is a gate, permitting the control of the discharge; through this the ore is discharged to what is termed the finishing hearth. In this hearth the roast is completed to a dead sweet roast, the ore being subjected to an intense heat from an oil burner. To withstand this heat, the rabble in the finishing hearth is water-cooled. The spindles throughout the furnace, which travel at a speed of about 1.5 revolutions per minute, are driven by a series of worm-gears and worms at the top of the furnace, where they are not exposed to the heat. On each of the decks of the furnace are a series of doors, which can be opened or closed as desired to increase or decrease the quantity of air admitted, and consequently control the roast as desired. As the ore discharges into the finishing hearth a small quantity of salt is added for the purpose of attacking the lime which is present in the ore. This of course is necessary only in some instances, as many ores do not contain as much lime as those of Hodson. When the charge is brought to a sweet roast, it is discharged through a slot in the bottom of the finishing hearth to a push conveyor, which carries it to the ore bin, cooling it in transit. By an automatic regular feed at the top of the hearth of the furnace and a constant automatic discharge from the finishing hearth to the conveyor, a capacity of about 10 tons of sulphurets is obtained.

The barrel process of chlorination is used in the plant, the ore being fed to the barrel from the bin above. The most successful work with the barrel has been obtained by revolving it about four hours, then running out the solution slowly to the settling tanks. From these settling tanks the solution is run to precipitating tanks, and then precipitated with SO_2 produced in a small iron retort with charcoal and sulphuric acid. The gas produced passes through a water-cooled coil and through lead pipe to the precipitating vat. As soon as the gold is converted into a metallic state, the gas retort is disconnected and the solution is run from the precipitating tank through lead piping into and through a filter filled with sawdust. During this operation a small jet of air is introduced in the precipitating vat, to pre-

vent the gold settling in the vat. Second to the furnace itself, this precipitating with SO_2 and filtering with a sawdust filter are important features. Practically all of the precipitate remains in the top 6 or 8 in. of sawdust. When a clean-up is desired this sawdust is removed and placed in iron trays in a small reverberatory furnace. The fire is started and the sawdust is burnt, leaving an ash in the trays containing the gold. This ash is mixed with borax a little in excess of its own weight, and is melted in a clay-lined plumbago pot, producing a bullion almost perfectly fine.

California crude oil is used for fuel in the Merton furnace, and is very satisfactory, the amount consumed being a little less than four barrels per day of 24 hours. This fuel, delivered at the mine, costs $1.25 per barrel, which would give a cost for fuel per ton of sulphurets roasted of about 47c. The chemicals used range about as follows: Sulphuric acid, $1.56 per ton; chloride of lime, $0.53; salt, $0.26; total, $2.35 per ton.

The economy in labor cost in the operation of this plant is remarkable, there being only one man required for each shift, and a chlorinator, who has the general supervision of the plant. At first the 24-hour day was divided into two shifts of 12 hours each, but though the work to be done amounted to very little, the hours were rather long, and it was deemed more expedient to divide it up into three shifts. This has added somewhat to the labor cost, but produces better results in the quality of roast, as the men give their charges better attention.

The amount of power used for the plant is only 5 h.p., including the operation of the furnace, barrel and compressor for supplying air to burners, and air for agitation. Figuring at $5 per horse power per month, this would make a cost of about 8.33c. per ton of ore roasted. The amount of wear and tear on the plant is so little as to be hardly perceptible, but from records which Mr. Merton gives from Australia the cost of repairs does not exceed 2c. per ton of ore roasted.

While the foregoing is the result of the work to date, it is believed that with more experience in the handling of the furnace and the study of the chemical treatment of the ores, these results can be improved upon.

SOLUBILITY OF COPPER OXIDE, ETC., IN AMMONIA.—E. Murmann finds that cupric oxide, hydroxide and carbonate are immediately soluble in ammonia water, if commercial ammonium carbonate or some other ammonium salt be added in amount equal to half the weight of the copper compound.

GERMAN PIG IRON PRODUCTION.—The output of the German blast furnaces in August is reported by the German Iron & Steel Union at 851,651 tons, which is 5,324 tons more than in July. For the eight months ending August 31 the total production of pig iron in Germany was as follows, in metric tons:

	1903.	1904.	Changes.
Foundry iron	1,191,487	1,196,043 I.	4,556
Forge iron	585,933	552,895 D.	33,038
Steel pig	489,991	406,122 D.	83,869
Bessemer pig	290,754	287,615 D.	3,139
Thomas (basic) pig	4,117,539	4,254,716 I.	137,177
Totals	6,675,704	6,697,391 I.	21,687

Steel pig includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys used in making steel. The total increase this year was 0.3 per cent; it was almost all in basic iron.

IRON AND STEEL IN GREAT BRITAIN.

The production of pig iron in Great Britain for the first half of 1904, as reported by the British Iron Trade Association, was less than that of the first half of 1903 by 330,033 tons, or 7.5 per cent. If a further comparison is made with the first half of 1902, a decrease is shown of 47,513 tons, or 1.2 per cent. It is necessary to go back to 1901 to find a lower output.

The production of pig iron for the half-year is shown in the following table, in long tons, in comparison with the first half of last year:

	1903.	1904.	Changes.
Foundry and forge	2,096,313	1,850,463	D. 245,850
Bessemer pig	1,716,069	1,606,660	D. 109,409
Basic pig	456,371	506,970	I. 50,599
Spiegel and ferro	110,245	84,872	D. 25,373
Totals	4,378,998	4,048,965	D. 330,033

Of the 15 iron-making districts into which Great Britain is divided, for the purposes of these returns, 11 show a decrease, and the remainder show an increase in 1904 compared with 1903. The most notable declines appear to have taken place in Scotland, in West Cumberland, in Lancashire, in Notts and Leicestershire, in South and West Yorkshire and in Cleveland.

The total production of steel ingots for the first half of 1904 was as follows, in long tons:

	Acid. Tons.	Per ct.	Basic. Tons.	Per ct.	Total. Tons.
Bessemer	553,071	21.8	312,612	12.3	865,683
Open-hearth	1,326,882	52.3	343,247	13.6	1,670,129
Totals	1,879,953	74.1	655,859	25.9	2,535,812

There were 480 open-hearth furnaces in existence at the close of the half-year. A notable change took place in the Cleveland district, the two works which formerly made acid steel having adopted the basic process, so that all the steel made in that district in 1904 was basic steel.

The production of rails from bessemer steel during the half-year was 523,771 tons, which compares with 483,964 tons in the first half of 1903, and 410,420 tons in 1902. The greatest increase in rails was in the South Wales district.

The total production of steel ingots in the half-year was as follows, in long tons, comparisons being made with the first half of 1903:

	1903.	1904.	Changes.
Bessemer	911,670	865,683	D. 45,987
Open-hearth	1,639,239	1,670,129	I. 30,890
Totals	2,550,909	2,535,812	D. 15,097

The total decrease this year was 0.6 per cent. Open-hearth steel this year was 65.9 per cent of the total, and bessemer, or converter, steel was 34.1 per cent; against 64.3 and 35.7 per cent, respectively, in 1903. The open-hearth process continues to make steady gains.

COAL MINING IN HAINAUT.—The output of coal in this Belgian province amounted to 17,666,010 tons in 1903, from which 16,544,570 tons of washed coal were obtained, the waste thus amounting to 6.3 per cent. Altogether 100,372 persons were employed in and about the mines, the average daily wage being 4.07 fr. The number of females employed was 5,711, of which only 48 now work underground. There were 32 coke plants in the province, comprising 2,757 ovens, and giving employment to 1,909 persons. The output of coke amounted to 1,546,690 metric tons, as against 1,396,570 tons in 1902. Briquettes are manufactured at 33 works in the province, the 1,267 men employed producing 1,366,900 tons, of an average value of 17 fr., $3.28 per ton, as compared with 1,281,580 tons, and 16 fr. 40c. respectively in the previous year.

SAULT STE. MARIE CANAL TRAFFIC.

The movement of freight through the Sault Ste. Marie canals in September was very heavy, amounting to 5,246,657 tons. For the season up to October 1 the total movement was: Eastbound, 14,716,540 net tons; westbound, 5,373,092 tons; total, 20,089,632 tons. The total to the corresponding date in 1903 was 26,893,820 tons, showing a decrease of 6,804,188 tons, or 25.3 per cent. The total number of vessels reported this year was 10,584, showing an average cargo of 1,895 net tons.

The mineral freights included were as follows, in net tons, except salt, which is given in barrels:

	1903.	1904.	Changes.
Anthracite	893,153	638,459	D. 254,694
Bituminous	4,642,588	3,208,389	D. 1,434,199
Total coal	5,535,741	3,846,848	D. 1,688,893
Iron ore	17,745,150	12,394,797	D. 5,350,353
Pig and manuf. iron	124,969	139,856	I. 14,887
Copper	76,359	65,533	D. 10,826
Silver ore		1,313	I. 1,313
Building stone	9,640	19,116	I 9,476
Salt, barrels	300,668	281,959	D. 18,709

While the commerce through the canals to October 1 lacks 6,804,188 tons of equaling the commerce for the corresponding period of last year, it is nevertheless proportionately greater. Navigation on the great lakes did not practically open this year until June 15, so that a good six weeks was altogether lost. The discrepancy is likely to be minimized by the end of the present month for the movement this month is exceedingly heavy for October.

A NEW ELECTRIC FURNACE.—A new electric resistance furnace, designed by a German, Herr O. Frölich, is built up of bricks of a material which conducts the electric current in the cold state about 25 times less than carbon, and hot, 16 times less; it is not attacked by direct currents of usual voltages, and the melting point lies above 2,000° C. The furnace temperature of such a jacketed furnace can be pushed above 1,600° C., if desired.

PETROLEUM IN ZANTE.—United States Consul J. V. Long, at Patras, Greece, reports that an English syndicate has recently begun a search for oil on the island of Zante. The present operations are on the site of what have been known for centuries as the "pitch wells," located in the southernmost portion of the island, some 10 miles from the town of Zante. These pitch springs, or wells, are usually named among the interesting antiquities of the island, and received descriptive mention by Herodotus, Pliny and others. In the larger of the two springs the pitch is seen bubbling up, as it comes from the earth, beneath exceptionally clear water. The substance rises in large bubbles, which assume the form and appearance of rubber balls, until the inclosed air bursts the globules and the pitch passes off. The output of this spring is estimated at about three barrels a day, and can be utilized for commercial purposes when mixed with pine pitch, although in its crude state it is comparatively valueless. The English syndicate began its operations in boring for oil quite recently in the immediate vicinity of the bubbling spring. It started with the most approved modern boring machinery and methods, and is backed by substantial capital. The discovery of petroleum in this region is confidently predicted by geologists and others who have studied oil territory in other countries.

BOOKS REVIEWED.

Iowa Engineering Society. Proceedings of the Sixteenth Annual Meeting. Arthur J. Coxe, Secretary. Des Moines, Iowa; published by the Society. Pages, 156; illustrated.

This volume contains the papers read before the Iowa Engineering Society at its latest annual meeting in 1904, together with the proceedings of the meeting. A number of interesting papers are included, chiefly on town and city engineering, on sanitary matters, and on the regulation of streams and rivers. The society is evidently an active one, in which members take a lively interest.

The Michigan Technic. 1904. Ann Arbor, Mich.; published by the Engineering Society of the University of Michigan. Pages, 116; illustrated.

This volume contains the papers read before the Engineering Society of the University of Michigan during the past session. These are chiefly on practical subjects in various engineering departments. Thus we find papers on 'Good Roads,' on the 'Manufacture of Portland Cement,' on 'Tests of a Kerosene Engine,' on 'Gas Analysis in Gas Engine Tests,' and on the 'Testing of Lubricating Oil.' The papers show a variety of work on different lines, most of it evidently very carefully done.

State Demurrage Rules; with Digest. Compiled by John B. Daish. Chicago; the *Grain Dealers' Journal.* Pages, 72. Price, $1.

This book gives the laws of the various States in relation to charges for the detention of cars for unloading, or other purposes, commonly known as demurrage charges. The States having such laws are Connecticut, Florida, Georgia, Louisiana, Minnesota, Missisippi, Missouri, North Carolina, North Dakota, South Carolina, Texas and Virginia. Following the laws themselves is a digest showing in tabular form the main features of the laws in each State, such as free time allowed for unloading and loading, special regulations for various classes of freight, and the like. It is a useful manual for shippers and consignees of coal, ore and other minerals.

Points for Buyers and Users of Tool Steel. By George W. Alling. New York; the David Williams Company. Pages, 224; illustrated.

This book was primarily designed and written for the benefit of those who have not had a technical education, and who have become, through circumstances, buyers and users of tool steel. It contains, however, a great deal of information that will be useful to the engineer and the technical man as well. It is thoroughly practical, and deals very little with theory. For instance, there is nothing about percentages of carbon, cementation, and the other refinements in which the metallographists indulge. The writer's intention is not to make a complete treatise, which would be impossible, nor to do away with the necessity of experience, which is of so much importance in such matters which he treats of. He admits the value of practice, and desires rather to give such hints as will assist the tool-maker by showing him what to avoid, and by helping him to formulate and use to advantage the hints which experience may have given him. Viewed in this light, it is a very useful and practical book. It is accompanied by definitions of a number of technical terms, and by some useful tables.

Journal of the Iron & Steel Institute. Volume LXV. No. 1, 1904. Edited by Bennett H. Brough, Secretary. London; E. & F. N. Spon, Ltd. New York; Spon & Chamberlain. Pages, 784; illustrated.

We need hardly say that the half-yearly volumes, issued by the Iron & Steel Institute, always contain valuable matter. The standing of the contributors and the care with which the papers are edited assure this. The present volume is no exception to the rule. It contains the following papers, with the discussions called out by them: 'Explosions Produced by Ferro-Silicon,' by A. Dupré and M. B. Lloyd; 'The Manufacture of Pig Iron from Briquettes at Herräng,' by Henry Louis; 'Notes on the Production and Thermal Treatment of Steel in Large Masses,' by Cosmo Johns; 'Pyrometers Suitable for Metallurgical Works,' report of a committee appointed by the Institute; 'The Manufacture of Coke in the Hüssener Oven at the Clarence Iron Works and Its Value in the Blast-Furnaces,' by C. Lowthian Bell; 'The Range of Solidification and the Critical Ranges of Carbon-Iron Alloys,' by H. C. H. Carpenter and B. F. E. Keeling; 'Troostite,' by H. C. Boynton; 'The Synthesis of Bessemer Steel,' by F. J. R. Carulla; 'The Thermal Efficiency of the Blast-Furnace,' by W. J. Foster; 'The Plastic Yielding of Iron and Steel,' by W. Rosenhain; 'The Use of Steel in American Lofty-Building Construction,' by B. H. Thwaite; 'The Influence of Varying Casting Temperatures on the Properties of Steel and Iron Castings,' by P. Longmuir.

In addition to these papers, the proceedings of the Institute are given. Considerable space is also occupied by the 'Notes on the Progress of the Iron and Steel Industries,' which are carefully prepared abstracts of papers read before technical societies and of articles published in the technical press in all parts of the world.

A Treatise on the Principles and Practice of Dock Engineering. By Brysson Cunningham. London; Charles Griffin & Company, Ltd. Philadelphia; the J. B. Lippincott Company. Pages, 560; illustrated. Price, $6.

Dock construction presents many problems in construction, hydraulics and mechanics. It is rather a complex branch of engineering, but has, comparatively, not much special literature. The present volume, therefore, is useful in filling a gap in technical literature. The work is a large one, and really deserves a much more extended notice than space permits here.

The opening chapter is purely historical and general, and gives an interesting sketch of recent progress in dock construction. In Chapter II the subject of dock design is briefly discussed. The principles involved in this subject are plainly indicated, and practical illustrations of the application of these principles are supplied by diagrams and descriptions of the main features of various typical dock systems. In Chapter III we find a discussion of the principal engineering appliances used in such undertakings: Various forms of pile-drivers, concrete-mixers, excavators, dredges and hoppers, dams, pumps, etc. He discusses each appliance, and at times goes into theoretical considerations, as in calculating the conditions for equilibrium of pressures in a coffer-dam. Chapter IV deals with the materials of construction, and contains a large amount of valuable information, regarding concrete, iron and steel, timber and stone, their physical and mechanical properties, and their behavior under the action of sea-water. In Chapters V to VIII, inclusive, the author discusses the construction of the different parts of a dock system, beginning with the walls; then passing to entrances, passages, and locks; then to jetties, wharves and piers; and, finally, to dock-gates and caissons. In the first of these chapters there is much theoretical matter, as the author analyzes in detail the stresses in retaining-walls, applying Rankine's theory of conjugate pressures and also the theorems of Coulomb and Chaudy. Chapter IX deals with accommodation for goods on the quays, and discusses the features of the design and construction of transit sheds and warehouses. Chapter X is devoted to dock bridges, classifying them and describing the different types, and discussing theoretically the stresses in movable bridges. Chapter XI gives a comprehensive analysis of the requirements of repair shops and of the manner in which these are met in the construction of graving and repairing docks. The final chapter deals with the miscellaneous equipment necessary for efficiency and economy in the working of docks. There is an interesting discussion here of the relative advantages of water, steam and electricity as sources of power, and, from the results of practical crane tests by various experimenters, as well as from theoretical considerations, the author concludes that for convenience and adaptability electrical energy stands first, while hydraulic power has the advantage in simplicity and control. The remainder of the chapter is an exposition of the application of these two sources of energy to different classes of dock machinery.

The descriptions and explanations are made clearer by numerous diagrams, and there are many tables giving data which the engineer needs in his calculations. It is, in fact, a book which will be very useful for reference, as well as for study.

Relations between the Effects of Stresses Slowly Applied and of Stresses Suddenly Applied in the Case of Iron and Steel. Comparative Tests with Notched and Plain Bars. By Pierre Breuil. Published for the Iron & Steel Institute. London; E. & F. N. Spon, Ltd. New York; Spon & Chamberlain. Pages, 152; with 25 plates and 60 illustrations in text.

This valuable monograph describes the work carried out by M. Breuil while holding one of the Andrew Carnegie research scholarships of the Institute. It was considered so meritorious that the Institute awarded the author the gold medal for 1904. He is now director of the testing laboratory of the Conservatoire des Arts et Metiers at Paris. Probably the tests made by him were more extensive and thorough than any series of experiments heretofore carried out in a similar direction. Extensive as was the scope of the tests, the results seem to show that they were fully carried out. The results are clearly and carefully shown, in the text and in the numerous tables and diagrams which accompany and illustrate it. They will be of value to makers of iron and steel and to engineers using such materials in construction.

PLATINUM IN RUSSIA.—The output of platinum in Russia in 1903 is reported at 5,995 kg., against 6,126 kg. in 1902, a decrease of 131 kg. Only a trifling quantity was manufactured in Russia, the rest being exported as crude or refined metal—chiefly crude.

BOOKS RECEIVED.

In sending books for notices will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Statistiche Zusammenstellung über Kupfer. Halberstadt, Germany; A. von Hirsch & Sohn. Pages, 32.

Report on a Pathogenic Micro-organism. By Paul G. Woolley. Manila; Bureau of Public Printing. Pamphlet, 16 pages.

Movimento Commerciale del Regno d'Italia nell 'Anno, 1903. Prepared by the Ministry of Finance. Rome, Italy; published for the Ministry. Two volumes; 880 pages.

The Australian Tick in the Philippine Islands. By Charles S. Banks. Manila; Bureau of Public Printing. Pamphlet, 16 pages; with plates.

Texas Fever in the Philippine Islands and the Far East. By James W. Jobling and Paul G. Woolley. Manila; Bureau of Public Printing. Pamphlet, 16 pages; with plates.

The Century in Phosphates and Fertilizers. A Sketch of the South Carolina Phosphate Industry. By Philip E. Chazul. Charleston, S. C.; printed for the author. Pages, 76; illustrated.

University of Illinois, Engineering Experiment Station. Bulletin No. 1. *Tests of Reinforced Concrete Beams.* By Arthur N. Talbot. Urbana, Ill.; published by the University. Pages, 64; with diagrams.

The Thomas Iron Company. Proceedings of the Special Meeting to Celebrate the Fiftieth Anniversary of the Formation of the Company. Hokendauqua, Pa.; published by the Company. Pages, 64; illustrated.

United States Geological Survey Bulletins. No. 232, Gazetteer of Virginia. By Henry Gannett. Pages, 156. *No. 233, Gazetteer of West Virginia.* By Henry Gannett. Pages, 164. *No. 241, Experiments on Schistosity and Slaty Cleavage.* By George F. Becker. Pages, 36; illustrated. Washington; Government Printing Office.

United States Geological Survey. Water Supply and Irrigation Papers. No. 95, Accuracy of Steam Measurements. By E. C. Murphy. Pages, 172; illustrated. *No. 96, Destructive Floods in the United States in* 1903. By E. C. Murphy. Pages, 68; illustrated. *No.* 101, *Underground Waters in Southern Louisiana.* By Gilbert D. Harris and M. L. Fuller. Pages, 100; illustrated. *No.* 102, *Contributions to the Hydrology of Eastern United States.* By M. L. Fuller. Pages, 512. Washington; Government Printing Office.

United States Geological Survey. Professional Papers. No. 12, *Geology of the Globe Copper District, Arizona.* By F. L. Ransome. Pages, 168; illustrated. *No.* 24, *Zinc and Lead Deposits of Northern Arkansas.* By George I. Adams, A. H. Purdue, E. F. Burchard and E. O. Ulrich. Pages, 120; illustrated. *No.* 25, *The Copper Deposits of the Encampment District, Wyoming.* By Arthur C. Spencer. Pages, 108; illustrated. *No.* 26, *Economic Resources of the Northern Black Hills.* By J. D. Irving, S. F. Emmons and T. A. Jaggar, Jr. Pages, 232; illustrated. *No.* 27, *Geological Reconnaissance Across the Bitterroot Range and Clearwater Mountains in Montana and Idaho.* By Waldemar Lindgren. Pages, 124; illustrated. Washington; Government Printing Office.

Buenos Aires Harbor. A Technical History. By Luis A. Huergo. Prepared for the International Engineering Congress at St. Louis. Pages, 84; with maps and illustrations.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Strontium in Alloys.

Sir—I notice among the 'Metallics,' in the JOURNAL of September 22, an account of a certain alloy (patented) containing copper, zinc, manganese, iron, tungsten, aluminum, tin and strontium. The account says that "the strontium enables the tungsten to alloy with the other metals." Surely there is some mistake about this. I do not want to think that it is intended to take in some one.

CHEMIST.

London, Oct. 3, 1904.

À qui Sait Attendre.

Sir—In your issue of October, in your editorial on page 529, you use a favorite quotation of mine and call attention to the fact that it is so often misquoted. I am familiar with the French quotation from which our English one is taken, and I, myself, had misquoted the original. I looked the question up only recently, and the Professor of the French language in Columbia University gives me the following as the correct French quotation: *"Tout vient à point à qui sait attendre."* You say in your editorial *"Tout vient à temps pour qui sait attendre."* The literal English translation from the original French would therefore be: "All things come to a head to those who know how to wait." The term *"à point"* means, as a friend of mine suggests, "the consummation." The dictionary gives as the meaning of *"à point"*—"the very moment," "just in the nick of time."

BENJ. B. LAWRENCE.

New York, Oct. 12, 1904.

EXPLORATIONS FOR COAL IN FRANCE.—A possible extension south of the known coal measures of the Pas-de-Calais, has led several large French metallurgical companies to sink many deep bore-holes in search of the desired seams. Some of these holes found coal at about 1,000 meters depth. In a recent report Mr. Leon, chief engineer of mines of the Pas-de-Calais, stated that it was fair to infer that there was an extension southwest of the concessions now taken, but this extension is small. The exploring done is, therefore, but partially successful.

COAL IN SERVIA.—A German Consular report says that Servia is rich in deposits of lignite, while but one true coal seam is worked. The Servian State railway mined at Szenje, in 1903, about 90,000 metric tons of lignite; about 30,000 metric tons more were used for the briquette plant of a Belgrade firm. The total production of the Kingdom in 1903 was as follows: Coal, 5,000 metric tons; lignite, 135,000 tons; briquettes, 30,000 tons. The exports of coal were around 20,000 metric tons, most of which went to Roumania. The imports were mostly from Hungary.

ABSTRACTS OF OFFICIAL REPORTS.

Philadelphia & Reading Coal & Iron Company.

This company owns and operates a large estate in the anthracite region of Pennsylvania. It is a subsidiary of the Reading Company, which owns practically all the stock, and the lands operated are worked in connection with the Philadelphia & Reading railroad. The report covers the year ending June 30, 1904.

The capital stock of the company is $8,000,000, and the funded debt consists of $1,350,000, collateral sinking fund bonds. The company has an indebtedness in addition of $79,123,888 to the Reading Company, for money advanced over a series of years.

The statement of anthracite coal mined for the year is as follows, in long tons:

	By Company.	By Tenants.	Totals.
Lands owned	7,166,982	1,530,076	8,697,058
Lands controlled	214,501	173,265	387,766
Other lands	1,326,025	.....	1,326,065
Total	8,707,508	1,703,341	10,410,849
Total, 1903	6,299,449	1,283.530	7,582,979

The increases last year were: Coal mined by company, 2,408,059 tons; by tenants, 419,811 tons; total, 2,827,870 tons, or 36 per cent.

The company's statement of coal handled during the year is as follows:

	1903.	1904.	Changes.
Coal mined	6,299,449	8,707,508 I.	2,408,059
Coal bought	1,008,253	1,388,535 I.	380,282
Total	7,307,702	10,096,043 I.	2,788,341
Coal sold	6,842,537	9,758,140 I.	2,915,603
Coal in stock	557,245	866,192 I.	328,947

It will be noted that there is a discrepancy in the figures given for coal in stock which is not explained in the report.

The earnings and expenses may be summed up as follows, the averages being computed on the basis of coal sold:

	Amount.	Per Ton.
Coal sales, anthracite	$33,949,387	$3.48
Coal sales, bituminous	637,017	0.07
Coal rents	333,859	0.03
Interest, rents, etc.	330,911	0.03
Coal added to stock	760,204	0.08
Total earnings	$36,011,378	$3.69
Mining coal and repairs	$16,683,568	$1.71
Coal purchased, anthracite	3,119,700	0.32
Coal purchased, bituminous	593,306	0.06
Royalties, leased collieries	561,604	0.06
Taxes, repairs and damages	309,119	0.03
Improvements at collieries	1,273,035	0.13
Transporting coal by rail	7,428,812	0.76
Transporting coal by water	1,458,370	0.15
Handling coal at depots	432,004	0.04
Depletion of coal lands fund	454,241	0.05
Fixed charges and taxes	317,225	0.03
All other expenses	882,691	0.09
Total expenses	$33,513,675	$3.43
Net earnings	$2,497,703	$0.26

The average cost of anthracite coal purchased was $2.24 per ton. In the above statement we have included colliery improvements in expenses, as these are properly maintenance charges, and necessary to keep up the company's production. We find that the total charges attributable to mining were $2.36 per ton, or 68.8 per cent of the total; transportation and selling, $0.95, or 27.7 per cent; general expenses, $0.12, or 3.5 per cent. The total expenses were 93.1 per cent of the gross receipts.

The profit and loss statement may be summed up as follows:

Profit for the year, as above	$2,497,703
Surplus from 1903	1,422,361
Income from depletion fund investments	226,893
Sale of part of Brooklyn yard	213,734
Total credits	$4,360,691
Payment of coal trust certificates	$1,495,353
Adjustment of old claims	60,073
Interest, 2%, on Reading Co. loan account	1,582,477
Total charges	$3,137,903
Balance, credit	$1,222,788

The report says: "The cost of coal mined and purchased during the year was 4.1c. per ton higher than for the previous year, and

the price realized on all sizes was 11.6c. per ton less, making a total decrease in the net amount realized of 15.7c. per ton compared with the previous year.

"The funded indebtedness of the Coal & Iron Company was reduced by the payment of $206,000 divisional mortgage bonds, $30,000 collateral sinking fund bonds, and $3,600,000 coal trust certificates. In pursuance of the policy of the company to make reasonable provision against the depletion of its estate, there was set aside out of the revenue the sum of $454,241, being 5c. per ton on all the coal mined from the company's lands during the current fiscal year. The $2,104,647, in the depletion of lands fund March 1, 1904, was used in retiring the coal trust certificates. This fund contains now $454,241, being the amount of this year's appropriation.

"Work on the new shafts, etc., is being carried on rapidly, and it is expected that one of them, the Pine Knot shaft, will be in operation by the summer of 1905. By long experience we have found it necessary, to the economical working of the mines and to supply the public with coal, to store the sizes for which in certain seasons of the year there is little demand. In the spring and summer months there is usually an active demand for domestic sizes, but very little for the steam sizes; while in the winter the demand for the steam sizes exceeds the normal production. In mining coal we cannot control the proportion of sizes. The coal must be taken as it is mined, and in the preparation through the breaker the different sizes are produced, and such as cannot be sold must be stored. To secure adequate storage facilities we have increased the capacity of the Schuylkill Haven storage yard, and contracted for a new yard at Abrams, above Bridgeport, which, when completed in the early spring, will be capable of storing 500,000 tons of coal. The storage yard at Mahanoy City will be abandoned in the near future to enable us to mine the underlying coal."

The company maintains a beneficial fund for the payment of damages to injured miners and the families of those who may be killed. The statement of this fund shows that the operations for the year were as follows: Balance from previous year, $9,008; receipts from 26,867 contributors, $135,792; interest on investments, $1,347; total, $146,147. Payments for the year were as follows: Paid to families of 157 contributors killed, and to 3,950 contributors for injuries received, $115,030; invested in bonds for the fund, $15,223; total, $130,253, leaving a cash balance at the close of the year of $15,894. The total investments to the fund now amount to $35,000.

The Philadelphia & Reading Railroad report shows that the road carried during the year 11,324,624 tons of anthracite, and 8,059,243 tons of bituminous coal; a total of 19,383,867 tons. The average haul of this coal was 112.5 miles. The total coal traffic amounted to 2,180,936,831 ton-miles, and the total earnings from coal were $15,921,800, showing an average rate of 0.73c. per ton-mile. In addition to the revenue traffic, the railroad carried 1,703,246 tons of coal for the use of the company, and this traffic, not charged in accounts, amounted to 150,303,088 ton-miles.

BRITISH BLAST FURNACES.—The number of furnaces in blast in Great Britain during the quarter ending September 30 was 322. The estimated output of pig iron for the quarter was 3,016,000 tons.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Coal Briquettes.—I am told—by an inventor—that no practical briquettes have been made from coal up to the present time, and that no such briquettes are now in commercial use. Is this statement correct?—N. H. D.

Answer.—Any such statement is entirely misleading. In this country coal briquettes are not made on a commercial scale, except in one plant in California, which was recently described in the JOURNAL. This is the case, however, not because good briquettes cannot be made, but only for economic reasons; they cost more than coal of good quality can be purchased for in most parts of the country. That is, briquettes cannot be made at a price which will enable them to compete with coal. Should the price of coal advance generally, it will doubtless pay to make slack and culm, and also inferior, friable coal into briquettes. In Europe, they are made on a large scale and extensively used. In France a considerable part of the fuel taken by the railroads, and by the government for naval use, is in the form of briquettes. In Germany a large part of the brown coal, or lignite, mined, which is very friable and will not stand much handling, or transportation, is made into briquettes. Thus the German returns for the eight months of the present year ending with August show the production of 7,338,663 tons of briquettes. An output at the rate of 11,000,000 tons a year is certainly a commercial output; and if these were not practicable briquettes, they could hardly be sold at such a rate. So far as this country is concerned, the whole question is, as we have said above, one of cost and not of the possibility of manufacture.

Monazite.—Under 'Metallics,' in a recent number of the JOURNAL, I read that monazite is obtained principally from Brazil, where it is concentrated by the waves washing it up on the sea beach. Please say what is monazite, what is it like, and with what rocks it is found associated. What is it worth in New York?—I. H. B.

Answer.—With regard to monazite, we take the following from Merrill's 'Non-Metallic Minerals,' page 293: "Monazite is a phosphate of cerium minerals of the general formula (Ce,La,Di) PO_4. The crystals are commonly minute, often flattened; not uncommonly in form of small cruciform twins. The mineral also occurs in coarse masses, yielding angular fragments. Hardness, 5 to 5.5; specific gravity, 4.9 to 5.3. Color, hyacinth-red to brown and yellowish, subtransparent to translucent.

"The common form of occurrence of the mineral is that of minute crystals or crystalline granules, disseminated throughout the mass of gneissoid rocks. Owing to their small size they have been very generally overlooked, and it is only where, through the decomposition of the inclosing rock and the concentration of these and the accompanying heavy minerals—as magnetite, garnet, etc.—in the form of sand, that it becomes sufficiently conspicuous to be evident. Professor O. Derby was the first to point out the widespread occurrence of the mineral as a rock constituent, he having obtained it in numerous and hitherto unsuspected localities by washing the debris from decomposed gneisses of Brazil. Although widespread as a rock constituent and of interest from a mineralogical and petrographical standpoint, only the localities mentioned below have thus far yielded the mineral in commercial quantities."

In the United States monazite is found in western North Carolina, in the form of small brown, greenish or yellow-brown granules, often rounded by water action. These occur in the gold-bearing sands at several localities in western North Carolina. Crystals over an inch in length have been found in some places, and large cleavable masses, sometimes 3 or 4 in. across, in others. In Brazil it is found, as above stated, on the sea beach in the southern part of the province of Bahia. It is believed that the original source of this monazite were gneisses from which the mineral has been liberated by decomposition. In Russia it is found in some placers on the Sanarka river, in the Ural district; it is also found in some of the placer mines on the upper Lena and Vitim rivers, in Siberia. In Norway, it is found in pegmatite dykes, and is picked up by the miners while sorting out feldspar. The usual way of obtaining it is by washing, as in gold placers. The value of monazite is for the oxides of the cerium group of metals, which are used in making incandescent mantles under the Welsbach system of lighting. It is difficult to fix a market price, as the use is limited and the market is almost entirely with the Welsbach Company. Generally speaking, it will bring about from 10 to 15c. per pound.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

RIGHTS OF OWNER OF MINING CLAIM BENEATH SURFACE.—The owner of a mining claim is entitled *prima facie* to everything beneath the surface of his claim, and under such title may prevent the intrusion of any one not showing a paramount title to enter within the planes of his boundaries.—Maloney v. King (76 *Pacific Reporter,* 4); Supreme Court of Montana.

DEGREE OF CARE REQUIRED AS TO TUNNEL USED BY MINERS.—A dark tunnel leading to a coal mine, used by the owner of the mine in hauling coal, and by the miners in going to and returning from work with the consent of the owner, is a place in respect to which the owner of the mine owes to his employees the duty of ordinary care.—Williams v. Belmont Coal & Coke Company (46 *Southeastern Reporter,* 802); Supreme Court of West Virginia.

THE FACT THAT ONE SERVANT CONTROLS ANOTHER AT TIMES IS NOT CONCLUSIVE AGAINST EMPLOYER.—The mere fact that one of a number of servants, who are in the habit of working in the same line of employment for a common master, has power to control the actions of the others with respect to such employment, does not of itself render the employer liable for the negligence of the governing servant, resulting in injury to one of the others, without regard to other circumstances; nor will the fact that such servant sometimes or generally labors with the others, of itself,

exonerate the employer from such servant's negligence in the exercise of his authority over the others.—Consolidated Coal Company v. Fleishbein (69 *Northeastern Reporter*, 963); Supreme Court of Illinois.

TIMBERS USED BY BLAST FURNACES A PART OF THE PLANT.—Pieces of timber commonly used by blast furnace companies to scotch or chock hot-pots and hold them in position on inclined tracks on slag-piles while they cool are a part of the plant, and a defective condition in such timbers may render owner liable for injuries resulting from same.—Sloss-Sheffield Steel & Iron Company v. Mobley (36 *Southeastern Reporter*, 181); Supreme Court of Alabama.

DECLARATORY STATEMENT IN MONTANA MAY BE ON INFORMATION ONLY.—That the locator of a mining claim verified the declaratory statement on information only, instead of on his personal knowledge, did not render the statement void under the laws of Montana (Code Section 3612) requiring such declaratory statement to be verified by the oath of the locator. In the absence of proof tending to impeach the truth of the facts in such statement it is immaterial to an adverse claimant that the declaration was verified on information only.—Mares v. Dillon (75 *Pacific Reporter*, 965); Supreme Court of Montana.

OPTION TO PURCHASE, PROSPECT AND MINE IS A LICENSE.—The owner of a mining property gave another an option to purchase, with privilege of prospecting and mining ore; and it was agreed that all ore found which was susceptible of milling should be sold by the owner of the property, and the net proceeds applied on the purchase price. In case of failure to purchase, all payments were to be forfeited. In computing the net proceeds the cost of mining should be deducted. An option to purchase with privilege of prospecting and mining is a license coupled with an interest. The licensee having gone into possession and made expenditures, the license is irrevocable, and he is entitled to exclusive possession during the life of the agreement, and has during such life an interest in the realty and the ores produced.—Hall v. Abraham (75 *Pacific Reporter*, 882); Supreme Court of Oregon.

"SMELTER RETURNS" TO BE CONSTRUED BY ACT OF PARTIES TO CONTRACT.—The owner of mining property placed a deed in escrow, to be delivered on payment of certain sums before a specified time; all payments to be forfeited on failure to complete purchase. It was also agreed that 35 per cent royalty on smelter returns of all ores removed by purchaser should be paid to the owners and applied on price. It was held that while there was a failure to make the payments which terminated the right of purchase, it was not a rescission of the contract, and hence the owners were entitled to recover their royalties. In the absence of evidence the phrase "smelter returns" should be construed as meaning returns from the ore, less smelting charges, without deducting charges for hauling, freight and switching. And the parties having construed "smelter returns" by paying royalty on the value of the ore, less smelting charges, and without deducting for hauling, etc., such construction, in the absence of other evidence, will be adopted by the court.—Frank v. Bauer, (75 *Pacific Reporter*, 936); Appellate Court Colorado.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending October 11, 1904.

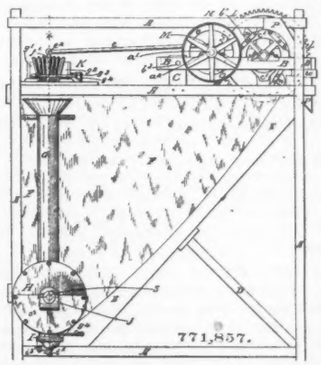
771,805. DRY SEPARATOR.—Fred. O. Bloom, Helena, Mont. The combination of a coarse screen for separating fine particles from the coarser particles, a drier disposed beneath said screen and having a discharge-opening for the dry material, means for simultaneously imparting movement to said screen and said drier, a sieve mounted on the under side of said drier beneath the discharge-opening, and a finer screen disposed beneath said sieve.

771,826. DEVICE FOR MEASURING THE SPEED OF FLOWING LIQUIDS.—Richard Lohse, Breslau, Germany. A device for measuring the speed of flowing liquids, comprising in combination, a hollow shaft, a wheel having inclined blades forming portions of a screw-surface, mounted on the shaft, said shaft and wheel being made of a material of approximately the same specific gravity as that of the liquid to be measured, a tubular casing of oxidation and incrustation resistant material, in which the shaft is coaxially mounted without the wheel-blades contacting with the casing-walls, a substantially conically shaped bearing for the shaft at the liquid-inlet, a worm on the shaft, a spindle located vertically and crosswise of the shaft, a worm-wheel on the spindle engaging said worm, and a counting and registering mechanism located coaxially of the spindle and driven by the same.

771,827. SECTIONAL COAL-AUGER NUT.—Julius H. Mason, Duncan Falls, Ohio, assignor of one-half to Spencer M. Garrett, Philo, Ohio. In a sectional coal-auger nut, the combination with the hinged nut-sections, and one of said sections having opposing trunnions and the other a cam-lug, of a lever rotatably mounted on one of said trunnions and recessed to embrace the base of the trunnion and said cam-lug.

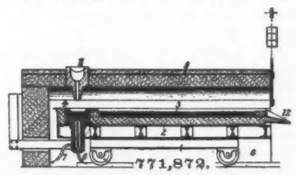
771,833. APPARATUS FOR MERCURIAL ALKALINE PROCESSES.—Charles W. Roepper, Germantown, Pa., and Willis E. Harmon, Mechanics Falls, Me., assignors to American Electrolytic Company. In an apparatus for the practice of mercurial alkaline processes, the combination of an amalgamating-compartment; a deamalgamating compartment; a main partition between the two; and a passage-way under the partition; the bottom of the amalgamating-compartment sloping downwardly from this passage-way toward its other end.

771,857. PNEUMATIC GOLD-SEPARATOR.—William Broadbent, Salt Lake City, Utah. The combination with a tank of two side casings with feed-openings therein, a depression provided with an opening



and closure therefor in the bottom of each side casing, a shaft extending through the side casings and tank carrying adjustable conveyer-blades within the side casings, sprocket-wheels on said shaft for driving it from a second shaft, and carrying perforated buckets, and means for delivering short puffs of air within the side openings near the bottom of the depressions.

771,872. FURNACE FOR THE MANUFACTURE OF STEEL.—Gustave Gin, Paris, France. A furnace structure, and a hearth inclosed by and movable relatively to said furnace structure, the hearth having two non-carbon electrodes to connect it with a source of electrical energy and having an open channel in which



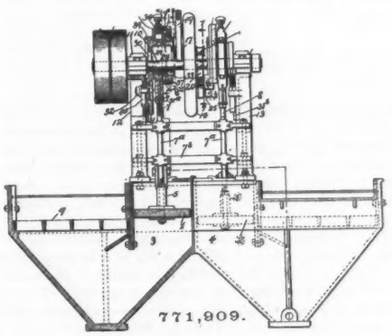
the iron is placed to be treated while at rest, the electrodes being the terminal points of the channel.

771,874. PNEUMATIC HYDRAULIC SEPARATOR.—William R. Grant, Denver, Colo., assignor to the Colorado Iron Works Company, Denver, Colo. An apparatus for separating and classifying material comprising a casing for holding a liquid and having an outlet at its top for fine material and a lower outlet for the coarser material and means for introducing air to rise upwardly in the said casing, said air-introducing means being interposed axially between the upper and lower outlets and at an intermediate height in said casing and diffusing air throughout the entire cross-sectional area of the said casing and leaving passages throughout the cross-sectional area for the free fall therethrough of the coarser material.

771,883. MACHINERY FOR MAKING SEAMLESS METAL TUBES, ETC.—Balfour F. McTear, Rainhill, England. Machinery for manufacturing seamless tubes or hollow bodies, comprising driven parallel cylindrical rollers adapted to hold the billet to be pierced and revolve same; a piercing-mandrel at one end of the rollers axially in line with the axis of the billet to be pierced; bearings at each end of the machine adjustable up to and away from the billet-supporting roller, under which said mandrel lies after the piercing action; and a longitudinally-movable stem at the back end of the billet also axially in line with same for supporting back ends of same.

771,887. LONGITUDINALLY-ADJUSTABLE CRUSHING-ROLLS.—James A. Thomas, Los Angeles, Cal. The combination, with journal-boxes, of a shaft rotatably and longitudinally movable therein, a roll fixed on said shaft, said shaft provided with transverse perforations or slots, gibs in said slots adapted to exert pressure against said journal-boxes, keys bearing against said gibs and against said shaft, and means operatively connecting said gibs and keys whereby the same may be operated to move said shaft longitudinally.

771,909. MINERAL OR ORE WASHING JIG.—Charles J. Hodge, Houghton, Mich. The combination of a driving-shaft, a pair of eccentrics through which



said shaft passes and which are adjustable transversely of said shaft, a fly-wheel mounted on said shaft between said eccentrics and a crank connection between said fly-wheel and each of said eccentrics.

771,940. CRUSHING-ROLLS.—James A. Thomas, Los Angeles, Cal. The combination, with journal-boxes, of movable shafts rotatably mounted therein, rolls fixed on said shafts, said shafts provided with slots, means operating through said slots upon said boxes, said shafts provided at their ends with seats, wear-plugs within said seats provided with threaded bearings, adjusting-screws threaded into said bearings, and adapted to operate upon said means, means locking said wear-plugs in said seats, and lock-nuts upon said adjusting-screws.

771,994. DRYING APPARATUS.—Frederick Meyer, Chicago, Ill. A drier comprising a rotary drum having two annular rows of shelves secured within same, one of said rows being disposed nearer to the center of the drum than the other, the inner row having two alternating sets of shelves, the shelves in one of said

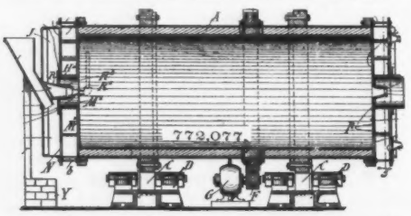
sets being disposed radially of the drum, and the shelves of the other set being disposed tangentially, the shelves in the outer row being spaced from the shelves in the inner row to permit the contents of the drum to be dropped from the outer shelves to the inner shelves and to be returned to the outer shelves through the revolution of the drum.

772,040. GAS-GENERATOR.—Franklin G. Hobart, Beloit, Wis., assignor to Fairbanks, Morse & Company, Chicago, Ill. A heating apparatus comprising a chamber containing a shelf-like projection from the side, a continuous closed heating passage extending under the projection, and means to heat said passage, means for supplying liquid to be vaporized upon said projection, a scraper thereon and an outlet for said vapor.

772,047. HOISTING AND CONVEYING MECHANISM.—George W. Menefee, Berkeley, Cal. The combination of a double cableway, a double-ended windlass for said cables, a carrier on the cables, derrick-ropes to haul the carrier in either direction, and a windlass for each derrick-rope.

772,065. WELL-DRILLING CABLE.—Andy C. Smith, Brookville, Pa. A well-drilling cable comprising a wire rope, and a hemp rope flexibly connected thereto.

772,077. TUBULAR BALL-MILL.—Max F. Abbe, New York, N. Y. The combination with a cylinder provided with a spiral feedway at either end for the entrance and discharge of the material, of a feed-chamber exterior to the spiral feedway provided with a central opening, a stationary hopper passing through



the central opening and discharging into the feed-chamber, and a bifurcated pipe provided with oval-shaped openings at one end, one opening arranged at either side of the stationary hopper, and with one circular opening at the other end terminating in the central part of the spiral feedway for conducting the air from the exterior to the interior of the cylinder.

772,084. HOIST.—Thomas E. Brown, New York, N. Y., assignor to Otis Elevator Company, East Orange, N. J. The combination in a hoist, of an incline, a carriage adapted for travel up and down said incline, means comprising a cable for effecting the travel of said carriage and the raising and lowering of receptacles, and a holding device for said carriage, which holding device is mounted on the incline, said holding device comprising a catch and an electromagnetic device for moving said catch to disengage it from the carriage.

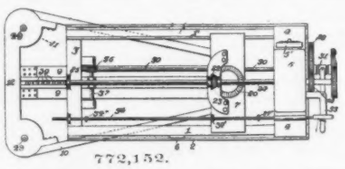
772,102. ELECTROPLATING APPARATUS.—Willis R. King, New York, N. Y., assignor to The Hanson & Van Winkle Company. In an apparatus for cleaning, plating and burnishing, the combination, with a tank, of a container or basket in said tank, a shaft upon which said container or basket is affixed, said container or basket and said shaft both being removable from said tank, a spindle rotatively arranged in one end of said tank, said spindle being in alignment with said shaft when the container or basket is placed in the tank, and thereby provides a direct and continuous length of shafting, and a means of separable connection between said spindle and said shaft.

772,123. LEAD CONTAINING-CELL FOR SECONDARY BATTERIES.—Vincent G. Apple, Dayton, Ohio. A lead containing-cell for secondary batteries whereof the containing-wall structure is thinner and denser than ordinary cast walls, formed in a single piece, without seam or joint, of lead, cast under pressure while in a softened or molten condition.

772,131. APPARATUS FOR THE MANUFACTURE OF GAS.—Charles H. Claudel, Argenteuil, France, assignor to Compagnie du Carburateur Claudel, Paris, France. An apparatus for the gasification of combustible liquids, comprising a vertical retort, means for heating said retort, a tubular part or vaporizer arranged in the axis of the retort and terminating at a certain distance from the bottom of the same; means for conducting the pulverized combustible liquid to the upper portion of this central part, a series of independent baffles located in the annular space between the central tube and the wall of the retort and arranged to divide said annular space into separate portions communicating in series by restricted openings, and a gas-outlet at the upper portion of the annular space.

772,135. PRESS FOR FORGING, SHAPING, OR PUNCHING METALS.—James Dodge, Newark, N. J., assignor of one-half to David Blake, Newark, N. J. In a power-press having cross-head fixed at the top, the combination, with a ram movable vertically beneath the cross-head and carried downward by its own weight, of a driving-shaft, a plunger movable vertically beneath the ram and reciprocated continuously by the driving-shaft, two horizontal series of interspaced teeth carried respectively by the ram and the plunger and adapted, when the teeth are opposed, to lift the ram, one of said series being mounted to move laterally, and means actuated by the operator for engaging the series of teeth with one another, to lift the ram when desired.

772,152. COAL MINING MACHINE.—Joseph F. Joy, New Eagle, Pa. In a mining-machine, a stationary frame comprising channel-beams and angle-irons arranged therebelow, end frames connected to said beams and irons, a frame slidingly mounted on



said stationary frame composed in part of centrally-arranged angle-irons, the bases of which slidingly engage said end frame and the webs of which form supports for the means whereby the same may be driven.

772,164. PROCESS OF DECHROMIZING IRON.—Otto Massenez, Wiesbaden, Germany. A process of dechromizing iron high in chromium, which essentially consists in exposing the metal to an oxidizing-flame in the open-hearth furnace, absorbing the chromic oxide formed by a slag which is easily fusible by itself and proportioning the amount of such slag so that a chromiferous slag containing at most 13 per cent of chromic oxide is formed.

772,181. HEAT-INSULATING COMPOUND.—Joseph D. Scott, Shields, England. A heat-insulating compound, comprising powdered asbestos, powdered mica, a bonding substance and cement.

772,184. LIME OR CEMENT KILN.—William S. Speed, Louisville, Ky. The combination of a kiln having a discharge-orifice, a continuously-operable reciprocative force-feeder located below said orifice and adapted on its forward movement to carry the lime sustained thereon therewith, and to receive lime from the kiln through said orifice, and on its rearward movement to cause a quantity of the lime to fall over the front end of the same, and means for preventing the lime from falling off the rear end of said feeder.

772,200. DEVICE FOR REPLACING FUSES.—Herbert G. Addie, Cresco, Iowa. A box comprising a fuse-holding magazine, and having an extension adapted to receive the fuses singly from said magazine, means for holding the fuses at the entrance of the extension, and means for holding a fuse in operative position within the extension, said last-mentioned means being arranged within the electric circuit.

772,206. PROCESS OF MAKING AND SEPARATING ALKALI SALTS FROM INSOLUBLE COMBINATIONS.—Henry S. Blackmore, Mount Vernon, N. Y. A process of making and separating soluble alkali salts from insoluble combinations which consists in subjecting the insoluble material containing alkali compound to hydropneumatic disintegration and transformation by exposing the constituents to applied increased and diminished pressure in the presence of a solvent.

772,224. APPARATUS FOR MANUFACTURING GAS.—Robert Dempster, Marietta, Ohio. An externally-heated retort formed of a number of connected superposed chambers, perforated tubes disposed within each of the chambers and extending from end to end thereof, packing of finely-divided material surrounding said tubes, air-supply pipes leading into one end of each of the chambers, air and oil supply pipes leading into the opposite ends of the chambers, thereby to form a number of volumes of gas to be intermingled by passage through said finely-divided packing material.

772,247. METHOD OF PRODUCING BRICKS, ETC., WITH COATINGS OF CARBORUNDUM OR SIMILAR MATERIAL.—Louis E. Muller, dit Louis d'-Emile Muller, Paris, France. A method of coating the surface of ceramic material consisting in compressing the powdered coating material into a plate, placing the plate in a mold, applying the powdered ceramic backing material to the plate and while the materials are thus arranged in the mold compressing the same, thereby causing the opposing surfaces of the plate and ceramic material to interpenetrate and bind the surfaces together.

772,259. PIPE-MOLD.—Levi Shell, Sibley, Iowa. A pipe-mold comprising a base-plate provided with an orificed boss, a shell, a core comprising core-sections, a bracket-arm on each of the core-sections, and a rod engaging the bracket-arms and the orifice in the boss and holding the core-sections assembled.

772,262. SELF-BONDED CARBORUNDUM ARTICLE.—Frank J. Tone, Niagara Falls, N. Y. A refractory coherent article composed substantially of superficially-oxidized particles of crystalline or amorphous carborundum, which are bonded by the oxidation and consequent cohesion of said particles.

772,266. AIR-COMPRESSOR.—Stephen E. Alley, Glasgow, Scotland. In a stage gas-compressor the combination of a differential trunk reciprocating piston, a cylinder divided by it into two compression-chambers, an inlet-conduit and an exhaust-conduit both terminating in one of the two compression-chambers, a sliding valve adapted to open and close both conduits, a valve-operating mechanism by which that sliding valve is given simple harmonic motion across the conduits, a fluid-operated valve controlling the exhaust-conduit and situated at a point therein which is farther from the cylinder than is the sliding valve, means for exerting pressure upon the fluid-operated valve sufficient to normally close the exhaust-conduit and so proportioned as to apply to the valve a thrust greater than that which immediately that the sliding valve opens the exhaust-conduit is exerted upon it in such a direction as to tend to open it by the air in compression in that portion of the exhaust-conduit which is between the loaded fluid-operated valve and the piston.

772,268. DEVICE FOR OPENING THE END-GATES OF MINE-CARS.—Seymour W. Ault, Glencoe, and Paul K. Reed, Warnock, Ohio. A device for automatically opening the end-gates of mine-cars, the combination consisting of a self-dumping car provided with a hinged end-gate, beams hinged to the frame above and means for supporting the same, a beam, loosely connected to said beams, connecting-rods, the ends of which are attached to the beams and cross-beam, in a manner that, when the rear ends of the beams are elevated by contact with the ascending cage the end-gate of the car will be opened.

772,292. MACHINE FOR MOLDING ROUGH CONCRETE BLOCKS.—Thomas Podmore, Wilkesbarre, Pa. In a molding-machine of the class described, in combination with a relatively fixed mold open on opposite sides, an ejector operating from one side of the mold, a feed-hopper having a discharge-neck spaced from and disposed opposite the opposite side of the mold, and a plunger, guided on the neck of the hopper and adapted to operate in the mold.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending September 24, 1904.

22,308 of 1903. HEATING BLAST.—J. Higham, Manchester. Improved means of heating the air supply of melting furnaces, by means of the gases from the furnace.

24,493 of 1903. SMELTING LEAD SULPHIDES.—A. Saveloberg, Ramsbeck, Germany. Adding limestone to sulphide of lead so as to make it possible to smelt direct in the blast furnace without any roasting.

8,722 of 1904. FREEZING PROCESS OF SINKING SHAFTS.—K. Schmidt, Erkelenz, Germany. Improvements in the circulation of cooling liquids and gases used in freezing processes for sinking mining shafts through boggy ground.

13,743 of 1904. PULVERIZER.—E. H. Benjamin, Oakland, California, U. S. A. Improved construction of pulverizer in which the ore is thrown by centrifugal force against a crushing surface.

14,411 of 1904. ORE SCREEN.—W. H. Baxter, Leeds. Improved elevating and screening apparatus for use in connection with ore or stone breakers.

15,308 of 1904. MAKING LEAD SALTS.—A. G. Betts, Troy, New York, U. S. A. Making a soluble salt of lead (dithionate) by acting on manganese dithionate with peroxide of lead.

SPECIAL CORRESPONDENCE

Denver. Oct. 15.

Notwithstanding the labor troubles during the year, it is probable that the total production of the Cripple Creek district will reach $23,000,000, as the figures for the nine months just completed reached over $16,000,000, and the output is constantly increasing.

The arguments in the case of the Western Federation of Miners against the Leadville District Mining Association, to prevent the latter from discriminating against the Federation by using the card system, have been heard by Judge Owers. The mine owners claim the right to employ whom they please, and that no conspiracy or coercion exists.

Up to October 1, 1,175 carloads of ore have been shipped from Idaho Springs during the current year, which is an increase of nearly 30 per cent over 1903. This ore is virtually all treated at the Denver smelters.

A movement is on foot to reorganize the General Metals Co., and it is understood that a meeting will be held in New York at once, when a committee will be appointed to propose a plan for reorganization. As this plant employs about 125 men, and can, if in satisfactory financial condition, secure a large amount of ore for treatment, it is hoped that it will not remain idle long. Judge Hallett, in the United States District Court, rendered a decision whereby the affairs of the company are to be adjudicated in this State, instead of in the Southern District Court of New York, which had appointed Alfred Roelker as receiver, on the application of the creditors in that city. It is reported that Judge H. G. Lunt, on behalf of the Colorado creditors, has gone to New York to request the court to transfer the case to this State, where the largest indebtedness exists.

The people in the southwestern part of the State, especially about Durango, are very much pleased with the prospect of the building of the railroad from that point south into Arizona, and the necessary preliminary surveys are being made with that object in view. It is understood that the federal government will assist, as far as the granting of the rights of way through Indian reservations and government land is concerned. The completion of this railroad will furnish an outlet for the products of a number of districts and for the coal in the vicinity of Durango.

Houghton. Oct. 17.

The Atlantic mine is producing rock that shows improved copper values with the creasing depth. The north portion of the property, tributary to shaft A, is productive of very low-grade rock, and for the last year operations have been conducted with a view to permanent abandonment of this unprofitable territory. All those points which have shown pay-rock in the drifts at the north end are being worked out, and the drifts in that part of the property have not been extended in the last 12 months. The profitable ground, tributary to shaft A, therefore, has been quite thoroughly exhausted, and the life of the shaft is drawing near its close. In the meantime, the improvement with depth in the other parts of the property has resulted in a gradual increase in the copper production, and the discontinuance of shaft A will not affect the production unfavorably. Extensive overhauling has been under way in the Atlantic mill, and added economy is the result. Important prospective values are given to the Atlantic by the developments on Section 11 by Isle Royale, and on Section 15 by the Superior Copper Co. The lodes being developed on these properties underlie Section 16, which is owned by the Atlantic. The Isle Royale lode strikes across Section 16, giving the property an outcrop of the formation for approximately 6,000 ft. The Baltic lode does not outcrop on Section 16, but it can be reached through vertical shafts, and the section carries the lode on its underlie beneath the entire area. The Atlantic has already driven a cross-cut for a distance of approximately 3,000 ft., searching for the Baltic lode before it was discovered on Section 15. But this cross-cut was driven at a depth of only 150 ft., whereas it will be necessary to sink to a much greater depth before the lode can be reached as it strikes under the section. The cross-cut, however, doubtless penetrates the Isle Royale lode, and after more thorough exploration by the Isle Royale Co. can be identified in the Atlantic cross-cut. It is not probable, however, that the Atlantic will incur further expenditures on Section 16 until its neighbors have carried their explorations to a more definite conclusion. It has already spent a large amount in this work, and has, in fact, assisted in guiding the neighboring exploration on Section 15 by showing that the outcrop was not on Section 15.

The Copper Range Consolidated properties, including the Baltic, Trimountain and Champion mines, are constantly increasing their copper production. This is the result of both improvement in the quality of rock and an increase in the volume of shipments. The Baltic has recently received, and is now installing, another permanent hoisting engine. This will complete the surface equipment of the Baltic for an indefinite period, and will assist in a still further increase in the rock shipments. This increase is cared for at the mill by improvements in the machinery, which place the capacity of each of the four heads at considerably over 500 tons per day, which a year or so ago was the maximum. At the Trimountain, three of the four shafts are equipped with permanent hoisting engines. Increased boiler capacity at the mill during the past summer has put the plant in position to meet gradually increasing output. At the Champion, the first permanent hoisting engine is now being installed. The development hoists now in service have been adequate to meet the demands of the past, because the air-compressing capacity has not been sufficient to break the normal amount of rock. The new 100-drill compressor at this property is now in service, however, and the amount of rock hoisting is proportionately increased. At the mill the four heads are now operating at full capacity, while a two-head addition is under construction, the superstructure now being put in place.

ARTHUR L. CARNAHAN.

Duluth. Oct. 15.

The evident intention is that next year's mine operations shall be on a very much larger scale than those of 1904. New mines are being opened and older ones are being extended, both in the way of new stripping and underground development. Much of this is not merely the customary deadwork necessary ahead, but denotes a considerable extension of activity. Shipments for the remainder of the year will be large, and it is the hope of mining men that all stocked ore at mines shall be taken care of before the close of navigation. This applies not only to Minnesota, but to the Michigan ranges. It would seem from the number of new shipping orders now and soon to be put on books of lake yards, that the prospects are for an immense ore movement the coming year, and one can scarcely understand where the shipowners expect to come out. But they have never been more than a year or two ahead of the business they were after, and they may not be this time.

The Duluth & Iron Range road has let contracts for new and large car shops to local people, and will fill them with machines, particularly adapted for the repair of steel cars. The old shops were adopted chiefly for wooden cars. Neither of the Minnesota iron ore carrying roads will probably ever buy another wooden car for ore transportation.

Higgins mine, of the United States Steel Corporation, has begun shipments. It was hoped that it could send out 200,000 tons this year, but it will be lucky to do half as much. The mine is a large stripped proposition, and is mined by the milling process. Its plant of machinery is of the best and its capacity is very large. Stripping will continue into the winter. John Gill, manager of the Oliver mine, is in charge at this property. Higgins is a leased property, and has an excellent grade of ore, but is not a big mine, as Mesabi tonnages go.

Stripping at Jordan mine, near Hibbing, is to continue till late in the winter. It is done by hand. This is a milling pit, and the stripping is milled down the pit, trammed to the shaft and hoisted as though it were ore, a new method of handling material in these milling properties. Jordan is not a large mine, but exploration during the past year has increased the importance of its orebody very materially.

The Shenango Iron Co. has made arrangements with the United States Steel Corporation for a full and accurate exploration of the orebody and its thorough mapping in line with the methods the corporation has worked out and applied to its own properties. With this idea a drill had been started and will be worked all winter. It may be followed by others. The mine is stockpiling for next year. It has made slight shipments this season, and its production is now far behind its royalty payments.

St. Clair mine has ceased shipments and the stockpile on hand may not be moved this year. It is unimportant. A shovel that has been at St. Clair has been moved to Glen, where the 100,000-ton pile will be cleaned up before the close of navigation. This mine has been making a record for the year and will surprise the public with its total when the season's figures are given out. If costs could be given it would surprise them still more, for it is a model property. The stockpile of Pickands, Mather & Co., at Troy, has been shipped. The mine is idle and may remain so for a considerable time.

Salt Lake City. Oct. 14.

The directors of the Quincy Mining Co., of Park City, have made application to the district court in Summit county for a dissolution of the corporation. The company, several years ago, sold its property to the Daly-West Mining Co., and this is the last act in winding up its affairs.

Vice-President J. D. Wood, of the Daly-West Co., says that the connecting up of the underground workings of the Daly-West and Quincy mines, at Park City, and the closing of the hoisting works of the latter will make a saving in operating expenses to the former of nearly $5,000 per month.

Preparations for the enlargement of the Yampa smelter at Bingham are going on steadily, and Manager Walter S. Kelley expects the plant in its new form to be ready for commission about the first of next year. The minimum daily capacity of the roasting furnaces will be 400 tons, but the management hopes to handle nearer 500 tons. In addition to this, the reverberatories will take from 100 to 125 tons of ore a day. The mine superintendent, W. J. Craig, has been instructed to prepare to deliver 600 tons a day.

Rapid progress is being made in the construction of the 60-ton mill at the Stockton mine, near Stockton. Manager J. J. Trenam, of Salt Lake, says it will be in commission by November 15.

Production at the Boston Consolidated at Bingham continues to show a steady increase. It is expected that 9,000 tons will be moved during the present month.

R. M. Johnson, of Fay, Nev., has been named as receiver for the Mountain View mine at that place, and will attempt to straighten out its financial difficulties.

A Kentucky syndicate has acquired the Farmington group of claims, near Farmington, Davis county, and will develop it. Fred H. Perkins, of Salt Lake, is consulting engineer.

Early this week there was a strong belief manifested in the mining circles of Salt Lake that the important strike made on the 400-ft. level of the May Day in Tintic was, in part, if not wholly, within territory of the Uncle Sam Consolidated, notwithstanding the statement of May Day officials to the contrary. To satisfy Uncle Sam officials, they were granted permission to take their surveyor underground. The result of the examination was a verification of May Day claims, the workings where the ore is being extracted being probably 50 ft. from the side lines of the Uncle Sam.

The controversy between the farmers of the Salt Lake valley and the smelting concerns at Murray and Bingham junction over the smoke question is still wide of a settlement. A communication has been addressed to the farmers, which is signed by the managers of the sev-

eral plants, defining the position of the latter. The smelter men claim that while they are as anxious as any one to find a solution for the problem, it will take time to do so. Inasmuch as the smelters are not all built alike, it is claimed that what might remedy the evil in one case might not in the others. The smelter men suggested the appointment of three competent experts, two to be selected by the smelting companies and one by the farmers, whose duty it should be to conduct a series of experiments and determine a solution that will fit each of the plants. The proposition will be submitted to a mass meeting of the farmers, which has been called for October 20. In the meantime the latter are going ahead with their organization. Until this year no damage has been done to growing vegetation, except in the immediate vicinity of some of the plants, in which cases the land involved has been usually purchased. Recently, however, the damage has been noticed over a wide scope of country.

Bisbee. Oct. 12.

Nothing more is heard from the reported find of ore in the new tunnel on the Backbone claim of Higgins, and the general opinion is that it has petered out, though work continues there. The company has reduced its working force. Before long it will have to face the question of taking up its bonds, and a very large sum will be necessary, for the bond was at a high figure.

Wolverine & Arizona has also reduced its working force, but is pushing ahead underground as fast as possible, driving toward the region in which Lake Superior is at work.

Red Jacket & Bisbee has suspended operations and abandoned its options. Its money is exhausted and its stockholders have lost all they put in. This was not very much, comparatively speaking, for the company never succeeded in selling much stock.

An interesting fact in connection with the area of broken ground in the center of the district is that Calumet & Pittsburg pumps are thought to be draining Junction shaft, and there are indications that water in Lowell and Calumet shafts may be the same body. These three shafts are at the apexes of an equilateral triangle whose sides are about 3,000 ft. long. Free circulation of water is an indication of a condition of ground favorable for the deposition of ore. The immense amount of water lifted from Calumet is supposed to have been due to the large area of open ground draining toward any opening made, and not to any unusual circumstance in the vicinity. The shaft at this mine is now bottomed at 1,000 ft., and is to rest at 1,100, where drifts will be started. It is now in leached and oxydized lime and very soft ground, bearing every indication of ore close by. The flow of water is growing less, and is easily handled by one of the two Prescott pumps installed this summer. No work is under way on the 910-ft. level other than the new drift toward Junction, which is rapidly nearing a corresponding drift from the other. Both these are in favorable ground, and both are on Calumet territory.

Lake Superior is preparing for a largely increased force, and new dry and change rooms have been built. The enlargement of Cole shaft, which is to be undertaken at once, will necessitate suspension of operations below the 1,000-ft. level. The management figures that this enlargement can be completed in 90 days, but this seems impossible. Still nothing appears impossible with this Lake Superior company of expert miners and managers. With this shaft completed Lake Superior will enter the ranks of copper producers in a large way. A third shaft will be started later to develop the southeast portion of this company's ground. The latest find in this property is an important one, being ore running from 7 to 30 per cent copper, in 1,100-ft. cross-cut No. 2. It may connect with ore found previously in 1,000 and 900-ft. levels.

Oliver shaft, Calumet & Arizona, is being equipped for production. A large double-drum hoist to handle skips from 1,500 ft. is ready for installation as soon as the foundations are built, and these are now under way. A battery of oil burning boilers is going in, and new buildings for surface plant are under way. The mine is now 1,000 ft. deep and orebodies of a very satisfactory nature are being developed. Still Oliver is not deep enough to get the larger lenses, and it will be steadily sunk. It should go 250 ft. further to reach proper depth. This company's old reliable Irish Mag shaft is increasing developments steadily and is hoisting about 700 tons of ore daily.

Pittsburg & Duluth's orebody seems to be of large size, so far as developments can show. The company is now a development concern, with 50,000 shares, issued at $15 each and paid for in full. In November it is probable that it will be reorganized into a mining company, with $2,500,000 issued, $3,000,000 authorized, capital. This will be allotted to holders of development stock, giving them in return for every old share and $25 five mining shares of a par of $10 each. This will raise in cash for development, etc., $1,250,000. No circular has yet been issued, but one is looked for prior to November 1. Every shareholder in the development company will doubtless take his full allotment and no subscription will be asked from the public.

Calumet & Sonora, four miles from Greene Consolidated, is preparing to sink its two shafts to cut the lenses the management hope exist there. It is a Minnesota company, owned largely in the northern iron regions.

The Mitchell Development Co., with properties bonded in the Huachuca mountains, near here, is trying to get extensions on its bonds, which expire shortly. There has been dissatisfaction with its management both among land owners and stockholders, and it is rather doubtful if extensions can be secured without modifications of the original agreements. The company is owned in northern Michigan and now has bonds on 33 claims in Montezuma cañon, across the San Pedro river.

Telluride. Oct. 10.

The Alta mines are reported to have been making money during the past year; they are now running night and day. The high-grade ore is shipped in its crude state direct to the smelters, while the lower grade is sent over the company's tramway to its milling plant. The concentrate yield is more than a carload per day. The success of these mines is largely due to the excellent management of A. C. Koch.

The Black Bear Mining Co. has one of the most promising mines in this district. It owns 14 claims, an excellent water power and a mill-site. In Ingram basin free gold has been found in the south drift, worth from 50c. to $1 per lb., and some of the streaks in the veins now uncovered are considered almost phenomenal. It is the intention of the company not to ship any more ore until next spring. Whatever ore is taken out during the winter will be piled on the dumps until that time, when the company expects to have completed its mill and new tramway.

Sixty-five men are now employed on the King & Lindsey lease, which is considered one of the most valuable claims in the district. It is 1,000 ft. long on the Smuggler-Union vein and is producing from 75 to 100 tons of ore daily.

Upper Bear Creek basin will presently lay claim to one of the richest gold and silver mines in the country. Recent tests prove it, but the details are withheld for the present.

Toronto. Oct. 13.

The following companies have obtained Provincial charters of incorporation:

The Canadian Lead Co., Ltd., head office Toronto, capital $1,000,000, provisional directors, Wm. H. Eccles, Harry A. Bonter, John H. Vampleu, Neil Sinclair and Frank Morison, all of Toronto, to carry on the business of mining, milling, smelting and otherwise disposing of galena and other metals and minerals; the New York Lake Erie Oil and Gas Co., Ltd., head office Windsor, capital $1,000,000, provisional directors, John W. Lovell and Alice W. Lovell, of Pelee township, Essex county, and Alfred H. Clarke, Alex. R. Bartlett and Agnes W. McGregor, all of Toronto, to explore, bore and operate for petroleum, natural gas and salt; the Lake Shore Natural Gas Co., Ltd., head office Fort Erie, capital $5,000, provisional directors James F. Foster, of Buffalo, and Henry W. Wendt, Albert B. Armstrong and Geo. A. Jackson, of Bertie township, Ontario, and the Cast Stone and Supply Co., Ltd., head office Hamilton, capital $100,000, provisional directors, Michael A. Pigott, John H. Tilden, Adam Zimmerman, John M. Harris, H. P. Colwin, Thos. J. Stewart and H. Carscallen, all of Hamilton, to manufacture blocks and structural material from cement.

Subscriptions aggregating about $400 have been received in aid of further research work by Prof. McLennan, of Toronto University, in connection with the radio-activity of the coal oils of the Brantford and Peterborough districts, and the natural gases of western Ontario.

Progress on the mines and refining plants of the Corundum Refiners, Ltd., near Palmer Rapids, Renfrew county, Ontario, is being steadily made, and contracts have been let for the construction of 30 dwellings for workmen. The village will be known as Jewellville, and a post-office has been opened there.

The Ontario Pipe Line Co., Hamilton, Ont., which has obtained a franchise from that city, has closed a contract with the Canadian Drilling & Development Co. for the drilling of 30 natural gas wells in the adjacent counties of Lincoln, Haldimand and Welland, 10 of the wells to be ready for operation by May 1. The Hamilton Gas Light Co. has also arranged for a supply of natural gas from the Dunnville gas field.

A special meeting of the shareholders of the Nova Scotia Steel & Coal Co., held at New Glasgow, N. S., on October 8, authorized the issue of $3,900,000 in 25-year consolidated mortgage gold bonds and the cancellation of 9,700 shares of preferred stock still in the treasury. An immediate issue to the amount of $1,500,000 will be made.

The Manitoba Gypsum Co., of Winnipeg, which recently acquired the property of the Manitoba Union Mining Co. at Gypsumville on Lake Manitoba, in addition to an area of gypsum deposits 1,200 acres in extent, immediately adjacent to its quarries, will at once enlarge the gypsum mill to double its present capacity of 10,000 tons per annum. It is preparing to construct a narrow gauge tramway connecting the mill with the quarries, 12 miles distant. The company controls the only gypsum deposit so far discovered in the Canadian west, and the hard-wall plaster manufactured from it is in steady demand. The enlarged plant will employ from 100 to 125 men.

Dr. Hans Goldschmidt, of Essen, Germany, lectured before the students of the Faculty of Applied Science at McGill University, Montreal, on October 7 on 'Aluminotherics,' showing the advances made in the process of creating high temperatures. He dealt with the use of aluminum oxide in the transmutation of iron into steel, and in a series of experiments demonstrated the superiority of aluminum oxide, or corundum receptacles over those of ordinary porcelain as regards resisting the effects of changes from heat to cold.

Victoria. Oct. 11.

Yukon.—Surveys are now being made for the location of a second ditch to constitute the main artery of the extensive Acklen waterway system. This ditch will be approximately 20 miles long and will tap the Twelvemile river at two different points, afterward converging into a main channel. Half the supply will be taken from the Twelvemile proper, the point of diversion being about 20 miles up the river, and the remainder will come from the tributary known as the Little Twelvemile. An application has been made to the mining recorder for permission to divert 5,000 in. at each of the two points and the ditch will be made large enough to carry that volume of water. The volume of water that will thus be carried to the high hills overlooking the Klondike will be greatly in excess of any individual requirements for hydraulic working, and while the promoters of the enterprise have not made public their intentions, it is believed that the ditch to be built next summer is but the beginning of an elaborate system that eventually will extend to the head of Bonanza, Bear and Hunker creeks and their tributaries.

Atlin.—The season has now practically closed, although on some of the creeks work will be carried on throughout the winter. Hydraulicking operations this year have been reasonably successful, and it is believed a record achievement in point of production has been made. The chief centres of activity have been Pine, Birch and McKee creeks, the highest returns having been realized from the latter, a recent clean-up at one mine yielding $75,000. Greater attention has been paid to quartz mining development, and in one instance the success of dredging enterprise has been demonstrated.

The Coast.—The Fraser River Gold Dredging Co.'s clean-up in August, working 444 hours, was 215 oz. It is now proposed to build two more dredges for operation about 30 miles above Lytton. According to reports the accounts of the Iowa-Lilloett Gold Dredging Co., which is also operating on the Fraser in this vicinity, have recently been found to show a shortage of $40,000, a clerk since admitting that the books had been destroyed at the instance of an employee.

Similkameen.—The Vermilion Forks Mining Co. has proved by hydraulicking that the gravel on its property runs from 24c. to 30c. per yd. The present supply of water is, however, inadequate. The company has also found by borings a large deposit of cannel coal.

Lardeau.—At a recent meeting of the directors of the Great Northern Mines, Ltd., Mr. W. B. Pool, who has acted as manager of the company since its inception, resigned that position, and Mr. B. Crilly was appointed his successor. Two carloads of concentrate from the Silver Cup mill were shipped to the Trail smelter last week, and a considerable consignment of bullion is expected to be made shortly. At the Silver Dollar mine, at Camborne, a 4-ft. vein of galena carrying excellent values has been encountered at 112 ft. in the tunnel.

Slocan.—The American Boy, upon which operations have been suspended for some months, is about to be reopened.

In the Slocan City division two new mines, the Blanfield and Edison, have entered the productive class, while the Fisher Maiden, which has been extensively developed, is about to make regular shipments.

In respect to zinc developments, the Lucky Jim mine has just completed the shipment to the sampling works of the Kootenay Ore Co., Mt. Kaslo, of a parcel of 1,000 tons of zinc ore, which has been sampled in four lots of about 250 tons each, giving results of between 50 and 60 per cent of zinc. The Slocan Star, the Ruth, and the Jackson mines have recently adapted their concentrators to turning out separate products of zinc and lead concentrate, and the two first have large piles of zinc concentrate awaiting the further treatment of magnetic separation by which the zinc contents can be raised to 50 per cent or over and the material made marketable at a remunerative price. To supply the want for this process the Kootenay Ore Co. is now adding to its sampling works at Kaslo a zinc separation plant which will be in operation when the concentrators resume their work in early spring. At Rosebery, on Slocan lake, a similar plant is being constructed to treat the zinc concentrate of that district. Work was also recently resumed at the Big Ledge group on Arrow lake. The ore here carries high zinc values, and it is proposed to ship this product to the new plant at Rosebery.

Nelson.—The last monthly returns from the Ymir mine state that from 2,750 tons of ore crushed 734 oz. of bullion were produced, the estimated realizable value being $8,150. In addition 257 tons of concentrate were shipped, valued at $6,7000, and 1,900 tons of tailings, yielding $1,251. The working expenses for the month were $14,951.

The Hunter V. mine, which is now shipping ore to the Greenwood smelter, has arranged to ship a part of the product to Northport.

An important strike is reported to have been made on the Foghorn, another vein of galena eight feet in width having been uncovered.

Rossland.—Development work recently begun by Le Roi No. 2 Co. on the Evening-Eureka group, has already resulted in ore of good grade having been encountered, there being now a fine showing of auriferous quartz in the winze where operations are in progress. I am given to understand on good authority that the examination of Le Roi, Centre Star, War Eagle, and possibly the Snowshoe, in Boundary, mines by Prof. Brock, with a view to the amalgamation of these properties is likely to proceed shortly, certain difficulties that stood in the way having been overcome.

Monterey. Oct. 12.

The statistics for the past fiscal year show the coinage value of the silver production of Mexico to be $83,000,000. This is an increase of 167 per cent in the last 20 years. This increase is largely due to the improved railroad facilities, and as they are being extended much more rapidly in these later years, a production of $200,000,000 is prophesied in the near future. Most of this is exported, and as the home consumption is comparatively small, Mexico may at no distant time have something to say about the silver market. In the copper market she already stands nearly at the top.

In Guerrero, a new company has been formed, with E. de B. Lukis as manager, to operate the San Mateo and San Luis gold and silver properties in the Taxco district, about 40 miles from Naranjo station of the Cueruavaca branch of the Mexican Central railroad. Pumps and machinery will soon be installed. James G. Fort and Robert James have raised about $50,000 gold with which to develop El Gallo. It is understood that the Guggenheim Exploration Co. is negotiating for La Reforma of Vicente and José Ortiz, in Campo Morado. The latter has a record of $20,000 Mexican for its monthly production. An option is said to have been secured by an American company on the Mercury mines of Rubio Romero at Huitzuco.

In the State of Sonora, near Bacoachi, the Guerrero mine, which has a 6-ft. vein of sulphide running about 6 per cent copper, with enough gold and silver to pay for mining and concentrating, is being put on a paying productive basis as rapidly as possible. The Picacho, of the Phelps-Dodge Co., near by is shipping a high-grade gold ore. The Phelps-Dodge people have also cleared up the lawsuit which has been pending for some time over the Sierra de Cobre, just outside of Cananea, formerly known as the Indiana-Sonora, by paying the equivalent of $2,000,000 gold for the property, and Geo. A. Laird, for several years in charge of the Victoria mines of San Luis Potosi, is making a thorough examination of the property preparatory to starting up on a large scale under his management. The Guadalupe mine, near by, which for unknown reasons has been idle some time, is to resume operations. The Gutierrez mine, at La Barranca, has made a good strike of $50 ore at its 300-ft. level, but the shaft will be continued to the 600-ft. level, and in the meantime a Russell lixiviation plant will be erected. At Camp Hays the new 30-stamp mill of the Hays Consolidated Mining, Milling & Lumber Co. has just been started. In the Magdalena district, La Brisca Gold Mining Co., of J. A. Campbell and American associates, of Cananea, with $1,000,000 gold capital, is preparing to start the work on its placers, adjoining those of the Greene Consolidated Gold Mining Co., before the first of the year.

London. Oct. 8.

The British South Africa Co. occupies a good deal of the attention of the investing and speculative public at present. A week ago I reported that 1,000,000 new shares were to be issued at 21s. each, and that underwriters had been given the opportunity of taking up half of these at 20s., in spite of the fact that the present market price is 30s. It is probable that this proposition of the directors will not be confirmed at the meeting of shareholders to be held next week, for it gives a wholly unjustifiable advantage to the favored underwriters. In the meantime, the report of the company for the year ending March 31, 1903, has just been issued. This report being so belated, does not give much idea of the present state of finances, but it contains a good deal of interesting matter. The total expenditure during the year amounted to £1,051,000, of which £798,711 was spent on southern Rhodesia, that is, the Salisbury and Bulawayo district; £65,694 on northeastern Rhodesia; £46,084 on northwestern Rhodesia, or Barotseland; £24,000 general South African expenses; £45,000 general London expenditure, and £62,500 interest on debentures. The largest item was £468,000, which was devoted to the administration and policing of southern Rhodesia. The revenue for the year amounted to £633,000, so there was a deficit of £418,000. The income was derived partly from hut tax (£104,000), while customs yielded £128,000, and sale of stamps and licenses, £127,000. From a careful perusal of the report and accounts of this year and previous years, it seems doubtful whether the income will ever reach the expenditure, unless new sources of income become available. It is possible that some discovery of precious or useful metals might directly increase the income of the provinces, or the development of the mineral and agricultural resources might be such as to warrant the imposition of new taxes. But as developments proceed at present, it is doubtful whether the community could stand additional taxation. The question as to whether the company and its assets should be taken over bodily by the State, and the capital converted into public debt, is not likely to be settled just at present. Theoretically, there is no reason why it should not be taken up at once, except that the residents do not feel equal to providing more revenue, and that the home government does not care to undertake any more financial burdens at present. As long as the shareholders in the British South Africa Company cheerfully come forward to supply further funds, so long will the government find it convenient to postpone their assumption of additional responsibilities. It is interesting also to note that Earl Grey, who was vice-chairman, has vacated that office on his appointment as Governor-General of Canada, and that Mr. Beit has been elected to the position instead. The fact of his taking up the onerous duties shows that he has recovered from the severe indisposition, from which he suffered last year.

Kalgoorlie. Sept. 10.

The Golden Horseshoe has been for some years past one of the most consistent producers on the Kalgoorlie field, the average monthly output from the mine standing at something like 17,000 oz. The mine possesses four orebodies, known as the No. 1, 2, 3 and 4 lodes. The bulk of the mill supply comes from the No. 3 and 4, and it is from rich pockets in these two lodes that the high-grade ore despatched to the smelters is drawn. About 400 ft. of driving has been done on the No. 2 lode at the 300 ft. level, but quite recently a start was made to work this orebody at the 200 and 400-ft. levels. Very little has been done with the No. 1 lode, and attention has been chiefly devoted to the opening up of the bigger orebodies, the No. 3 and 4. The mine's bottom level is at 1,100 ft., but the management, anxious to prove the property at greater depth, is now sinking the main shaft—already down 1,280 ft.—and purpose driving a level at 1,400 ft.

For some years the management of the Horseshoe was in the hands of Mr. J. W. Sutherland. Messrs. Bewick, Moreing & Co.* are now the general managers, and Mr. H. A. Shipman is the mine superintendent.

The method of treatment adopted on the Horseshoe is, briefly, wet crushing, concentration, fine grinding, agitation and filter-pressing of slime, and cyaniding, by percolation, of sand. What is known as the No. 1 mill is the original 50-head battery with 950-lb. stamps. The framework of this mill has recently been repaired and the plant is now in splendid running order. No. 2 mill is the new 50-head erected during Mr. Sutherland's management, and No. 3 mill comprises 50 stamps erected at the southern end of and connecting with No. 2. The stamps of No. 2 and 3 mills are weighted at 1,250 lb. It will thus be seen that

*The firm referred to has ceased to direct operations since this letter was despatched by our correspondent.—EDITOR.

the mine has no less than 150 stamps in full work—the largest battery plant in Western Australia.

The ore is hoisted through the No. 1, or main, and No. 2 shafts. The breaker station bin at No. 1 shaft has a capacity of 500 tons and the bin at No. 2 shaft a capacity of 400 tons. The capacity of the mill bins is 1,900 tons. After passing through the rock-breakers the ore is delivered to the mills by means of belt-conveyors. At No. 2 and 3 mills the conveyors discharge into a central pocket, and the ore is distributed throughout the bin by an automatic traveling tripper on the same principle as that in vogue at the Ivanhoe. The batteries are run at 106 or 107 drops per minute. At No. 1 mill a 600 screen is used, and on the other two mills a 700. The concentrating plant attached to No. 1 mill consists of 14 Weir and Wilfley tables and 15 fine-grinding pans. Attached to No. 2 and 3 mills there are 31 Wilfleys and 10 grit mills, each 16 ft.

All the sand and slime product from No. 1 mill is laundered across to the plant attached to the new mills, which has a settling capacity of 6,400 sq. ft. The sand is treated in 24 vats, 12 of which are superimposed, and the treatment occupies eight days. The slime plant consists of 22 agitators, with necessary filling and solution pumps, and 20 five-ton Dehne filter-presses, the agitation occupying from 16 to 24 hours. A belt conveyor—the largest in the State—is used in the disposal of the residues, which are dumped on the southern end of the property.

During August, the Golden Horseshoe treated 14,000 long tons of ore, but it must be remembered that in that month the re-building of No. 1 mill was effected. The management anticipates treating 17,000 tons per month, apart from the 1,500 tons of rich ore sent every month to the smelters. With such a large tonnage a reduction in costs per ton may be looked for, and the management will also be enabled to work some of the big bodies of lower-grade ore which exist in the mine.

HARRY J. BROOKE.

Perth. Sept. 12.

The August gold yield was 201,536 oz., valued at £715,455.

The Government has reconsidered its recent decision and has instructed the Boulder Deep Levels commission of inquiry to go into the Boulder Perseverance affairs. This is generally regarded as not only unnecessary, but as likely to do harm by playing into the hands of the bear operators, who are seizing all chances of attacking the stability of the mining markets.

It is announced that Mr. J. W. Sutherland, who is returning shortly from London, will resume the absolute control of the Golden Horseshoe, in place of Bewick, Moreing & Co. The main shaft is going down rapidly below the 1,200-ft. level, and in view of the increased tonnage now treated by the 150 head of stamps, all development will be kept well ahead. The Great Boulder is starting to open out at the 1,900-ft. level. Recent boreholes from that level have passed through three veins of ore from one foot and two and a half wide, carrying about average values. The determined bear raiders on Boulder shares seized upon these as indicating decreasing orebodies, but it is well known that at several other levels the orebodies near the main shaft have faulted or shown somewhat lower values. The management is confident that the 1,900-ft. level will open up as well as ever in size and value.

In the Boulder Main Reef some very encouraging developments have been made; two bodies of ore of fair grade were struck at the 1,400-ft. level, and further opening out shows improvement. In the Hidden Treasure lease some very rich specimen ore has been found at the 150-ft. level. A promising quartz formation has been found on some residential blocks north of the township.

Dividends paid by West Australian companies during eight months of this year amount to £1,329,807, of which the principal contributors were: Great Fingall Consolidated, £250,000; Golden Horseshoe, £180,000; Boulder Perseverance, £175,000; Ivanhoe Gold Corporation, £175,000; Great Boulder Proprietary, £153,125; Oroya-Brownhill, £123,750; Associated, £111,457.

On the northern fields the Lancefield is increasing its yield; August returns were 1,017 fine oz. from 2,334 tons treated. At Leonora the Pig Well has been getting exceptionally rich ore, a width of four feet averaging 20 oz. per ton. The Sons of Gwalia August yield was 5,194 fine oz. from 8,968 tons.

On the Great Fingall Consolidated the 11th (bottom) level is opening up well. The August yield was 13,759 oz. fine gold from 14,510 tons treated; working costs 16s. 9d. per ton. The month's profits were £34,265. The Great Fingall Associated has its new winding plant in order and has started sinking in earnest.

Some sensational pockets of gold are being found around Coolgardie, and mining matters generally look encouraging. Bayley's Consols crushed 254 tons for the fortnight, yielding 202 oz. gold. The Westralia & East Extension August returns were 1,651 oz. from 2,291 tons. Some rich ore has come in from the Carbine mine, taken from a very large lode formation at 30 ft. from surface.

Sydney. Sept. 19.

Queensland.—The gold yield for the month of August amounted to 52,472 oz. fine, bringing the production for the first eight months of the year up to 414,389 oz. fine. The dividends distributed during August totalled £65,000. A much healthier tone pervades the share market, and there is almost a complete return of confidence on the part of investors. As a consequence work is being much more vigorously carried on in the principal fields, and the shortage in previous returns should be speedily made good. The New Chillagoe Co. still manages to keep going, and the returns for the month of August show that the ore treated amounted to 2,299 tons, which yielded 31,974 oz. silver, 53 tons copper and 206 tons lead.

Victoria.—The gold mined in this State during the past month aggregated 73,906 oz. fine. The prominent feature of the industry is the satisfactory yields which are being obtained by the South New Moon Co. The last crushing of 580 tons yielded 1,311 oz., and the return for the previous week was equally as good. The richest ore is at present being obtained from the 1,220 ft. north and 1,060 ft. south levels. Prior to January, 1895, this company had made 33 calls on shareholders, but from then to the present time it has paid 100 dividends, aggregating £269,600, or £8 8s. 6d. a share. In connection with deep alluvial mining, the record of the Duke United Mines, Maryborough, for the half-year is encouraging. The income for this period amounted to £27,250, out of which £5,000 were disbursed in dividends. The extent and quality of the waste cut up and drained insures the maintenance of good returns for some time to come. The several companies interested in the Majorca and Berry deep lead systems are making determined efforts to unwater the two gutters. The Charlotte Plains Co. has started a 12-in. high-lift centrifugal pump, which delivers 2,500,000 gal. of water per day, against a head of 360 ft. There are three other companies operating within a radius of eight miles, and the leads are being drained at the rate of some 22,000,000 gal. per day.

Tasmania.—Matters on the Lyell field are somewhat perturbed, and there has been a heavy fall in stocks. At the North Lyell mine the lode intersected at the 600-ft. level has proved very disappointing. The drive went through ore assaying 10 per cent copper for a distance of 20 ft., and it was thought at the time that the permanency of the lode at a depth had been proved, but an intrusion of schist then came in, and at a distance of 65 ft. from the shaft the drive is in low-grade quartzite. In the expectation that this development is only temporary, exploratory work is being pushed on. The Lyell Blocks are in difficulties in connection with the new plant designed to deal with the copper-bearing clays. The returns first published set out that 1,400 tons of material treated gave a yield of only 17 tons 9-cut copper. However, after a sharp decline had taken place in shares, it was represented that the yield was much higher, and the directors, recognizing that the matter calls for some explanation, have commissioned a metallurgist to report as to the exact position of affairs. The output of tin ore from the Briseis mines during the month was 37 tons, the total quantity of over-burden removed being 68,585 cubic yards.

Auckland. Sept. 21.

During August the colony exported 46,773 oz. crude gold, valued at £178,624 ($893,120), which is a considerable increase over August, 1903. From present indications it may safely be said that this year's production of gold will exceed last year's, which was the largest on record for many years past. The silver exported during August amounted to 88,444 oz., valued at £8,875 ($44,375).

During the past six weeks, owing to the Molyneux river maintaining a fairly low level, a decided increase has taken place in the Otago dredging returns. The dredges working on the gorges of that river, however, have not been very successful, not so much owing to the depth of water as to the drift, which is constantly kept in motion by the swift current. Owing to the great amount of wash being turned over by the large fleet of dredges now at work, the effect of the gravel and stones thus set going is far more serious than it was a few years ago. That this would be the case is one of those simple things easily perceived after they have come to pass, but when claims were being taken up and dredges built in the boom of a few years back, it was overlooked by almost everybody.

A new company, known as the Mt. Aurum Quartz Mining Co., has lately been formed to work the property at Otago, formerly well known as the Phœnix, and later as the Achilles. The present holders have been prospecting for some months past, with the result that some promising ore has been developed. It is proposed to start crushing next month.

During the past few weeks several important developments have been reported on the Hauraki gold-fields, and there is a hopeful feeling in nearly all the mining centers. At Waihi the Waihi Extended Co. has made a connection at the 500-ft. level with the workings of the Waihi Grand Junction, thus proving the extension of part at least of the Waihi company's lode system right through the Grand Junction ground into the Waihi Extended. The lode in the latter property is 16 to 18 ft. in thickness, but is at present of low grade, assaying from traces only up to £3 per ton, and averaging probably not more than £1 per ton. There is every indication, however, that the lode will improve in depth. The Waihi Co. is opening up a new level (No. 7), about 150 ft. below No. 6, the lowest level now worked. No less than 1,800 gal. of water are at present being pumped per minute, but this large flow will decrease very considerably in a few weeks' time, partly because the water accumulated in cavities will drain away, partly because the Grand Junction Co., which is also opening out a new level, 630 ft. below the collar of its shaft, has just tapped water by breaking into the hanging wall of the main lode, and will, by its pumping operations, aid in lowering the water-level of the whole district.

At the Thames the New Moanataieri Co. is obtaining good ore from a winze sunk in a hitherto unworked block of ground. There is, it would seem, a likelihood of one of the rich patches for which the Thames was once so famous being unearthed in this mine. In this case an adjoining mine, the Kuranui-Caledonian, will probably benefit also, part of the unworked block being in its ground. The near future may therefore see a revival of the Thames as a gold-field. The boring operations are still being continued, but with little vigor, and so far no discovery of any importance has resulted from the half dozen or less of bore-holes which have been put down at various points.

The leading returns from the mines of the Hauraki goldfield during the past month are as follows: Waihi, £53,103 ($265,515), from 20,346 tons; Talisman, £7,357 ($36,785), from 4,405 tons; Komata Reefs, £2,900 ($14,500), from 1,230 tons; New Zealand Crown, £2,321 ($11,615), from 2,261 tons; Royal Oak, £1,385 ($6,925), from picked stone; Tairua Broken Hills, £1,128 ($5,640), from 550 tons.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. John Stanton is at Houghton.

Mr. George A. Schroter is now in Mexico.

Mr. S. L. Pearce has returned to Chihuahua, Mexico.

Mr. Robert M. Raymond is at Hot Springs, Arkansas.

Mr. Willard F. Snyder is in Boston on professional business.

Mr. Richard M. Atwater, of Helena, Mont., is visiting New York.

Mr. D. P. Rohlfing has returned to Salt Lake from a trip to Chicago.

Capt. A. F. Lucas, of Washington, visited New York during the week.

Mr. George Kislingbury, of Los Angeles, recently visited Salt Lake City.

Mr. W. E. Bloch, of the Boston Consolidated of Bingham, Utah, is in Boston.

Mr. James S. Cherry, of Glasgow, is on his way to examine mines in South Africa.

Mr. Arturo Moeller is in charge of the Gavalane mines in the State of Sonora, Mexico.

Mr. E. W. Sebben is at present examining some properties in Summit county, Colorado.

Mr. Ben Blanchard, of the Iron King mine at Prescott, Ariz., has been visiting New York.

Mr. C. S. Verrill is to take charge of the Mountain Boy mine near Republic, Washington.

Mr. Trumena Kuroda, of the Miike coal mine, Japan, is visiting New York and St. Louis.

Bergrath Raiffeisen, of Charlottenburg, Berlin, arrived in New York on his way to St. Louis.

Mr. Lester W. Strauss has returned to New York after two months' work in Idaho and Oregon.

Mr. Andrew J. Matraszek, manager of the Orscha Wire Works, Russia, is now in this country.

Mr. James W. Malcolmson arrived from London by the *Oceanic* and has returned to El Paso.

Mr. James A. Pollock, president of the Salt Lake Stock & Mining Exchange, is visiting in St. Louis.

Mr. Bennett H. Brough, the secretary of the British Iron & Steel Institute, is now in New York.

Mr. Walton A. Dowlen arrived from Paris by the *Kronprinz Wilhelm* on his way to Goldfield, Nevada.

Mr. John A. Kirby, late superintendent of the Daly-West mine of Park City, Utah, is at Goldfield, Nevada.

Mr. I. C. White, State Geologist of West Virginia, is examining the coal fields of Rio Grande do Sul, Brazil.

Mr. Hiram W. Hixon has returned from Mexico to the Victoria mines of the Mond Nickel Co., in Ontario.

Mr. Charles E. Rowe, of Denver, has returned from Lake county, Colorado, where he has been examining mines.

Mr. Kiichiro Takagi, of Tokyo, Japan, an engineer of the Mitsui Mining Co., is visiting the coal regions of Pennsylvania.

Mr. T. M. Foster, manager of the Missouri-Mexico Mining Co., of Hermosillo, Mex., has returned from a trip to this country.

Mr. Ramon Flores, of Hermosillo, Mex., has returned home after several months spent in the Lake Superior mining region.

Mr. Arthur W. Jenks severed his connection with the White Knob Copper Co. on September 1, and is now at Salt Lake City.

Mr. John A. Cleveland, who has been engaged in railroad construction in Ecuador for the past three years, has returned to this country.

Messrs. Burger & Siebert, of New York, have recently made an examination of the Planet Copper Mining Co.'s property in Arizona.

Messrs. Andrew Carnegie and E. Windsor Richards have been elected honorary members of the Liege Association of Engineers, of Belgium.

Mr. J. H. Hamilton, formerly sales manager of the Dillon-Griswold Wire Co., Sterling, Ill., is now associated with the Pittsburg Steel Company.

Mr. Harvey B. Small, chief mining engineer of the Peñoles Mining Co., of Mexico, is now in this country. He will visit in Chicago and St. Louis.

Mr. George Wanless, representing the American Smelting & Refining Co., has been examining lead properties in the State of Chihuahua, Mexico.

Mr. J. E. Bamberger has resigned as general manager of the Daly-West Co. of Utah, and his son, Mr. Ernest Bamberger, has been appointed to succeed him.

Mr. G. W. Lewis, of the department of chemistry at Harvard University, has been given a two years' leave of absence to accept a government position in the Philippines.

Messrs. H. A. Cohen and H. B. Hanley, respectively general manager and special expert for J. R. De Lamar, of Mercer, Utah, are visiting the Waldo district in Oregon.

Mr. Jeremiah Harrington, for a number of years superintendent of the Quincy mine at Park City, Utah, has accepted a similar position at the Galena mine at Bellevue, Idaho.

Mr. Wm. B. McKinlay resigns November 1 from the management of the Delta and Northern Gold Mining companies, which formerly operated dredges at Delta, Ida. The companies have ceased operating.

Mr. G. A. Wright has been retained as consulting engineer by Gilfillan, Wood & Co., who represent Fraser & Chalmers, Ltd., of London, in the Straits Settlements, Malay States, Dutch East Indies, Philippine Islands and Siam.

Mr. J. V. Williams, lately purchasing agent at the El Paso plant of the American Smelting & Refining Co., has opened offices at El Paso, Tex., to handle mine and smelter supplies and staples in iron and steel for the Mexican market.

Messrs. Ernest H. Simonds, assayer and chemist of San Francisco, and Lochiel M. King, recently superintendent for the American Smelting & Refining Co., at Oakland, Cal., have formed a partnership as metallurgical engineers, assayers and chemists. The new firm will continue the former's practice and retain the offices and laboratory of Mr. Simonds at 417 Montgomery street, San Francisco, Cal., and in addition will engage in general practice as metallurgical engineers.

Among the visitors at the mining engineers' headquarters at the World's Fair, St. Louis, last week were the following: W. B. Cogswell, Syracuse; J. M. Porter, Spokane; E. E. Dieffenbach, Balbach Smelter; H. Garlichs, New York; F. Manda, Japan; W. L. Clark, Pittsburg; Knox Taylor, High Bridge, N. J.; W. Byrd Page, Leadville; H. B. Sturtevant, Duluth; L. W. Wendt, Los Angeles; M. Eschweiler, Hanover, Germany; Robert T. Hill, Washington, D. C., and J. L. Phillips, City of Mexico.

Mr. Walter Fitch, of Beacon, Mich., who is to end his 30 years' residence on the Marquette range, and his long term of service at the Champion mine, to take the general management of the mines and smelters of the United States Mining Co., in Utah, was the guest of honor at a banquet given him on October 6 at Marquette by a representative gathering of friends and Lake Superior iron-mining men. Mr. M. J. Sherwood was toastmaster, and among those present were Messrs. William Kelly, James Russell, James McNaughton, F. H. Begole, A. E. Miller, D. F. Charlton, Geo. J. Maas, A. O. Jopling, J. E. Jopling, D. McVichie, O. C. Davidson, A. J. Yungbluth, A. B. Miner, J. C. Greenway, W. H. Johnston, Mark Elliott and D. H. Ball. Mr. Fitch was presented with a beautiful sterling silver dinner service of 12 pieces. Mr. Fitch's family, except his sons, who are students at the Michigan College of Mines, will accompany him to Salt Lake City.

OBITUARY.

Samuel Scott, a pioneer gold seeker of Montana, died at Missoula, Mont., October 9, aged 74 years.

James Lynch, a pioneer miner of Colorado, and owner of the Aztec mine, at Elizabethtown, Colo., died at Springer, N. M., October 12, from pneumonia.

John A. Groesbeck is dead from typhoid fever at Lima, Peru, aged 55 years. He was well known in the west as a mining expert, and developed many successful properties. Mr. Groesbeck was engaged at the time of his death in examining properties for the McCune-Haggin-Hearst Syndicate, near its Cerro de Pasco mines. He was a life-long resident of Salt Lake City.

This column contained last week a brief notice of the death of Edward Doerr. The following additional particulars have since been received: Edward Doerr was born in Fort Madison, Iowa, and was 39 years of age at the time of his death, which occurred at San Antonio, Tex., on October 4. His engineering career was begun as a surveyor for the Atchison, Topeka & Santa Fe railway, at the time it extended its line from Kansas City to Chicago. In 1888 he went to Mexico, and in 1890 entered the employ of the Guggenheim Smelting Co., as mine superintendent. He remained with this company until May 1, 1904, having, through his unusual business ability and technical knowledge, risen to the position as manager for Mexico of the Guggenheim Exploration Co., which position he held for several years prior to his resignation on May 1. Since May 1 he had engaged in consulting work, making Mexico City his headquarters. He was unusually successful, both in the technical and business branches of his profession, and was interested in many profitable mining and industrial enterprises. He was perhaps the best known mining engineer in the Republic of Mexico, and his career, so suddenly terminated, was most promising.

SOCIETIES AND TECHNICAL SCHOOLS.

Royal School of Mines.—A dinner was held on October 8 at Johannesburg. The committee consisted of Messrs. C. B. Brodigan, F. H. P. Creswell, H. D. Griffiths, J. H. Johns, J. G. Lawn, H. F. Marriott, J. Morris, A. E. Payne, C. Saner, A. R. Sawyer, J. E. Vaughan, H. Weldon, D. Wilkinson and C. Baring Horwood.

Society of Chemical Industry.—The first meeting New York section, session 1904-1905, will be held at the Chemists' Club, on October 21. Papers to be read are 'The Present Methods of Tannin Analysis and Their Influence on the Manufacture of Leather, by J. R. Mardick, and 'Thermometers and Mercury Vacuum Gauges," by H. W. Maurer.

TRADE CATALOGUES.

The Washington Pulley Co., of Ballard, Wash., has issued a complete illustrated catalogue of its standard and special pulleys.

The International Specialty Co., of Detroit, Mich., has issued a circular which describes its new emery wheel dresser—an artificial abrasive.

The Burt Manufacturing Co., of Akron, O., is sending out a little book describing the Cross, Style "B" oil filter which it manufactures.

The Hackensmith Wheel & Mine Car Co., of Penn Station, Pa., sets forth in a neat folder the advantages of the patent "Eureka" packed wheel.

Steam pipe casings for the prevention of loss of heat and power are described in a circular sent out by the Michigan Pipe Co., of Bay City, Michigan.

An artistic booklet comes from the Diamond Drill Contracting Co., of Spokane, Wash., and describes Stone's patent double tube, return water core barrel for diamond drills.

'Why the Schutte Valve Should Have Preference' is the title and subject of a small book

issued by the Schutte & Koerting Co., of Philadelphia. Its arguments are convincing.

In bulletins 101 and 102 the Lombard Governor Co., of Boston, describes respectively hydraulic relief valves, and its exhibit at the St. Louis Exposition. Both bulletins are illustrated.

Bulletin No. 2 of the De Laval Steam Turbine Co., of Trenton, N. J., is devoted to descriptions of direct current turbine dynamos, 7 to 300 h. p., and their parts. There are handsome illustrations.

'Graphite' for September, issued by the Joseph Dixon Crucible Co., of Jersey City, N. J., is a special number, and contains instructive and seasonable talks on the preservation of metal surfaces with Dixon's silica-graphite paint.

A new catalogue of their aerial rope tramways has been issued by A Leschen & Sons, of St. Louis, Mo. It contains descriptions and illustrations of some of the most recent installations, and is an impressive commentary on the development of aerial tramways by this firm.

'Before and After' is the title of two pictures of the North Amherst, O., quarry of the Cleveland Stone Co. before and after the installation of a compressed air plant by the Ingersoll-Sergeant Drill Co. The pictures are an eloquent witness of the efficiency of these plants.

In its record of recent construction No. 48 the Baldwin Locomotive Co., of Philadelphia, describes, with illustrations, some of the largest and newest types of locomotives turned out from its shops. Among these are engines recently made for the Delaware, Lackawanna & Western, the Mobile & Ohio, the National of Mexico, and other railroads.

INDUSTRIAL.

On October 1 the business of the Stewart Washer Co., of Birmingham, Ala., was consolidated with that of Roberts, Schaefer & Co., of Chicago. The business will be conducted under the corporate name of the Roberts & Schaefer Co.

The executive and general offices of the Niles-Bement-Pond Co. will be removed from their present location, 136 Liberty street, to the new Trinity Building, Broadway, opposite Pine street, New York, as soon as it is completed. This, it is expected, will be about next May. The Niles-Bement-Pond Company will occupy the entire 13th floor.

The Jeanesville Iron Works Co., of Hazleton, Pa., Denver branch, reports the following late shipments: Compound condensing mine pump, high lift, to Park City, Utah; one improved Jeanesville sinker to Cripple Creek; one sinker to Durango, Colo.; one sinker to Boulder, Colo., and one sinker to local dealers; one station pump to Silverton, Colo., and one station pump to Wyoming.

The Stromberg-Carlson Manufacturing Co., of Chicago, announces that the Kilbourne & Clark Co., of Seattle and San Francisco, have recently been appointed its representatives. Their territory includes Oregon, Washington, Idaho and Northern California. B. F. Kierelff, Jr., & Co., Los Angeles, Cal., have also been appointed representatives for the company, with the territory of Arizona, Nevada and Southern California.

The Austin Manufacturing Co., of Chicago, reports the following recent sales of rock-crushing plants: Taylor-Moore Construction Co., Hillsboro, Tex., No. 3 crushing plant complete; Cedar River Stone Co., Waverly, Iowa, a 1,000-yd. plant; E. F. Bush, Dennison, Tex., a No. 2 plant complete; Pepper & Register, of Philadelphia, a No. 5 crusher; Caird & Hawkesworth, Helena, Mont., a No. 2 crusher; W. J. Quinlan, Port Richmond, Staten Island, N. Y., a No. 5; Walter Sharpe, Eldorado, Kan., a No. 2, and Charles F. Meyers, Brookston, Ind., a No. 3.

The Power & Mining Machinery Co. has recently closed a contract with Mr. James E. Hooper, of Baltimore, for a 25 by 30 two-cylinder engine, and two No. 8 suction producers, the plant to be installed in his new cotton mill at Woodberry, Baltimore. The engine as installed will have three rope pulleys for driving to the floors of the mill, and the shaft will be extended for a flanged coupling, so that another 25 by 30 two-cylinder engine can be installed at a later date, it being Mr. Hooper's intention to double the mill after the first half is in operation. Mr. Hooper's original plan was to instal a steam turbine and electric drive, but after going into the matter very thoroughly he decided to abandon the equipment on account of first cost and materially lower efficiencies.

The National Electric Co., of Milwaukee, and the Hooven, Owen, Rentschler Co., of Hamilton, Ohio, offer an opportunity to purchase their exhibit at Block 46 Machinery Building, Louisiana Purchase Exposition. This unit consists of a National revolving field alternator of 1,500 k.w. capacity, direct connected to the New Hamilton Corliss vertical, cross compound, condensing engine, running at 83 r.p.m. The entire equipment represents the latest development of engineering design, and may be seen in operation until the close of the Exposition. A detailed description, with illustrations, will be mailed upon request, and the representatives of the above firms may be found at Block 46 Machinery Building. The National Electric Co. may also be interviewed at Section 6 Electricity Building, where a number of other direct and alternating units of smaller capacities are to be disposed of.

The B. F. Sturtevant Co., of Hyde Park, Mass., has installed the heating and ventilating apparatus in the City Hospital at Worcester, Mass. The arrangement in the new ward building is typical of the Sturtevant system. A Sturtevant fan draws the fresh air from the top of the building, a distance of about 45 ft. from the ground, through brick flues, and into galvanized iron ducts to the tempering coil, where the chill is taken from the air. It is then drawn through the fan which runs at a slow speed, typical to public building work, and forced through the heater containing coils of 1" steam pipes enclosed in a fireproof steel plate jacket and thence to the plenum chamber, which is divided horizontally into two chambers, one for the hot air and one for the tempered air, the latter passing underneath the heater from the fan. By means of mixing dampers, automatically controlled, the air is mixed to a desired temperature and is forced by the pressure from the fan through the distributing ducts to the different rooms. To assure positive ventilation in the rooms, a Sturtevant electric propeller fan located in the basement draws the air through registers in the floor into galvanized iron ducts and discharges it outside.

GENERAL MINING NEWS.

Mineral Oil Exports.—The United States exports were in gallons, as below:

	September.	Jan.–Sept.
Crude	8,657,896	72,007,962
Naphthas	1,522,925	14,568,565
Illuminating	67,587,761	562,026,685
Lubricating and paraffin	8,233,364	61,186,448
Residuum	2,503,074	22,553,883
Total gallons	88,505,020	732,343,543
Total, 1903	85,525,511	662,292,484
Increase, 1904	2,979,509	70,051,059

The increase this year was principally in illuminating oil and residuum. A marked falling off is shown in the exports of crude oil, lubricating and paraffin.

ARIZONA.

COCHISE COUNTY.

Calumet & Arizona.—Arrangements have been perfected for increasing the smelter capacity of this plant at Douglas. The necessary machinery for doubling the present blast, and two converters have been ordered and will soon be installed.

Mountain View Mining Co.—It is reported that this company's property near Bisbee is about to pass under the control of New York capitalists, in consideration of their raising $200,000 to put into the development work. It is expected that a mill will be erected soon. The new directorate elected is George Bennet, Charles Trotman, J. J. Rigler, J. E. Holmes, John N. Smith, C. A. McDonald and H. M. Wood.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—This company at Clifton is experimenting with the Hancock jig, a new concentrator which occupies the room of only two vanners. The capacity is such that two machines now installed are expected to take the place of 33 vanners and to handle 700 tons of ore a day. The average of the ores now being handled by the company runs from 3 to 4 per cent. The production for the month of September was equivalent to 1,236 tons of copper.

MOHAVE COUNTY.

Fletcher Mining & Smelting Co.—It is reported that this company at Kingman has paid off its indebtedness incurred in the recent working of its Stockton Hill mine.

Southwestern Mining Co.—This company is to drill a well at its Wall Street mine to obtain water and prospect the mine at depth.

PINAL COUNTY.

Ray.—An 800-ft. shaft will be sunk at this mine near Kelvin.

SANTA CRUZ COUNTY.

Maury.—A new set of Prescott pumps, with a capacity of 600,000 gal. per day, has recently been installed at this mine at Patagonia, and is now in operation.

YAVAPAI COUNTY.

(*From Our Special Corerspondent.*)

Alaska.—This group adjoins the Congress group and has the same general formation as the latter. The country rock is granite, the vein on Alaska group being within a diorite dike. The vein, which has a dip of 35° from the vertical, ranges in width from a few inches to 3 or 4 ft. The ore is quartz and dioritic material, carrying gold in iron oxides and sulphides, with a little free gold. Development consists of two incline shafts, 350 and 400 ft. deep, respectively, from which a considerable amount of drifting has been done on the various levels. Some of the ore is being milled at the Congress mill, making a table concentrate, in which most of the values are saved. This work has shown a value in the ore averaging $35 per ton. A hoisting plant is to be installed, probably with gasoline power. The property belongs to the United Gold Mines Co., of which A. J. Sullivan, of Congress, is president and manager.

COLORADO.

BOULDER COUNTY.

Eagle Rock Gold Mining and Reduction Co.—This company is building an electric lighting and power plant on its property in the Sugar Loaf mining district and will also enlarge its mill to double the present capacity. The mill will be equipped with 10 rapid-drop stamps, two tables, two jigs and slimers.

CHAFFEE COUNTY.

Stockman.—A test shipment of oxidized ores has been sent from this mine, five miles south of Salida. The property is owned by Otto Taubert and son, of St. Paul, Minn.

CLEAR CREEK COUNTY.

Jo Reynolds.—A tram is being built in this mine at Lawson, to connect with the Blue Ridge mill.

CUSTER COUNTY.

Bassick.—The lessees on this property at Custer are shipping a considerable quantity of crude ore.

FREMONT COUNTY.

Union.—The sampler at this mine at Florence, owned by the United States Reduction & Refining Co., has resumed operations. The capacity of the mill is 450 tons daily.

GUNNISON COUNTY.

Gold Cross.—A good strike is reported at this mine at Bowerman. George Brant is the owner.

Raymond.—A strike in the tunnel of this mine, near Pitkin, is reported. Some of the ore is said to run $100 to the ton.

HINSDALE COUNTY.

Handies Peak Gold Mining & Milling Co.—This company has been organized with a capi-

tal stock of $1,000,000, to carry on mining operations in this county. The directors are F. H. Sprague, S. McDermith, R. R. Ballinger, W. J. Robinson, Frank A. Ellis, J. E. Young and W. C. Burroughs.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Cloud City.—This mine is shipping about five cars per week of a very high grade of manganese iron, which could be doubled if the market conditions were more favorable. The shaft is now down 504 ft., and it is very probable that it will be sunk to the lower zone this fall or winter.

Elk.—This mine, near the Little Johnny, has opened up a small body of ore at the 250-ft. level that runs 12 oz. gold per ton. This was the basis of settlement on 12 tons that went to the smelter during the week.

Reindeer.—The immense body of ore in this property is so easily mined that it requires only a small force of men to keep the output up to 100 tons a day; the balance of the force are kept steadily at work developing the balance of the territory. Drifts are being run from the 450 and 500-ft. levels to the southeast, and the breasts of both are heavily stained with mineralized matter. The drifts are in about 500 ft. from the shaft, and the outlook is very bright for another ore channel being opened. The mine is dry, so much so that the men have to take water under ground to drill with.

Sunday.—This property has been working for several months on lease to J. Ingliss and associate. A small streak, varying from three to six in., running from five to seven ounces gold per ton, has been followed for quite a distance. The main vein is 10 ft. between walls and runs $50 per ton gold. The property is now shipping 40 tons a day. This section of the camp has never been developed, but now that a good body of ore has been opened, other claims in the district will be worked. The strike is important from the fact that it adds another paying section to the Leadville district.

Tuscon.—The remodelling of this shaft has been completed, and the work of erecting substantial surface buildings is now under way. The property belongs to the Iron Silver Mining Co. When the surface plant is finished underground work will be started to open up the Moyer oreshoot.

Yak Tunnel.—The new electrical engine was put in place during the week, and works very satisfactorily. The developing of the Tankerstown oreshoot continues uninterruptedly, and the work done shows a large body of ore. Work on the new concentrating mill progresses favorably, and when completed this mill will cost $180,000.

IDAHO.

BLAINE COUNTY.

Quincy Jr.—A new board of directors has been chosen for this company, consisting of Winsor V. Rice, James Farrell and Henry P. Henderson, of Salt Lake; H. J. Hoyt, of Muskegon, Mich., and Charles Hernheimer, of New York.

LEMHI COUNTY.

Oregon-Idaho Gold Mining Co.—A double-compartment shaft has been sunk on this company's property at Singiser, and it is said to be in ore running high in silver. Fifty additional stamps are to be added to the mill. A. Arlington Hibbs is general manager.

SHOSHONE COUNTY.

Hunter.—Operations are to be resumed at once at this mine at Wallace. The mill machinery has been thoroughly overhauled.

Monarch Mining Co.—This company is to instal a concentrator of from 25 to 50 tons daily capacity at its mine at Murray.

Snowstorm.—A compressor is to be installed at this mine at Mullan. The lower workings are in 1,072 ft., and the upper workings 400 ft.

MONTANA.

CARBON COUNTY.

Bridger Improvement Co.—The properties of this company at Bridger, which include coal mines and a town site, have passed into the hands of a syndicate headed by Samuel H. Glidden.

DEER LODGE COUNTY.

Anaconda Copper Mining Co.—It is reported that the refinery department of this company's plant will be in operation within a few months.

Last Chance and Nellie.—These mines, near Anaconda, have been leased and bonded to Mrs. Anna Burns and H. Deno.

Old Glory.—The vein at this mine at Anaconda is reported to be yielding 40 tons of copper-silver ore daily. J. Benton Leggat is in charge.

Potosi Mining Co.—The tunnel on this company's property is in 465 ft.

FLATHEAD COUNTY.

Flagstaff.—Good values in copper, gold and silver are reported in the shaft of this mine near Libby.

MADISON COUNTY.

Mammoth Mining Co.—The 10-stamp mill on this company's property on the South Boulder river is running continuously, and good results are reported.

MISSOULA COUNTY.

Kennedy Gold Mining Co.—This company, owning a number of placer properties in the St. Regis country, has been incorporated. The incorporators are as follows: John A. Scott, Fred W. E. Schmitz, Frank Trobestel, Thomas C. Marshall and Robert M. Bell. The company is capitalized at $250,000.

SILVER BOW COUNTY.

Taylor & Brunton Ore Co.—This company has sold its sampling works at Butte to the Washoe Copper Co. Sampling Works, which will continue the sampling and purchasing of ores for the Butte smelters belonging to the Amalgamated Copper Co. J. B. Gallagher will be manager of the works.

NEVADA.

HUMBOLDT COUNTY.

De Soto.—This mine, which adjoins the Sheba, has been sold to Salt Lake and Houghton, Mich., capitalists. A mill is contemplated.

WASHOE COUNTY.

Schour.—A rich strike is reported on this claim, one-half mile from Derby station.

ESMERALDA COUNTY.

Tonopah Club.—A good strike is reported on this claim, three miles north of Goldfield. It is owned by Henry Weber and others.

NEW JERSEY.

WARREN COUNTY.

Pahaquarry Copper Mining Co.—This company, which has been doing prospecting and development work for two years past on its property in Pahaquarry township, near Dimmick's Ferry, on the Delaware, has begun to put up hoisting and concentrating plants to handle 200 tons of ore per day. Foundations for the buildings are under way, and a large force is employed.

OREGON.

BAKER COUNTY.

Emma.—A bond and lease on this mine at Mountain View have been taken by A. P. Smith. The reported price is $10,000.

Imperial.—The stamp mill is kept steadily at work at this mine, Cable Cove. Stoping of ore has begun; heretofore ore has been taken from the dumps.

Lost Cabin.—A strike of free-milling ore is reported on this group, near Minersville. R. D. Evans is manager.

Mayflower.—A discovery of rich ore is reported in one of the up-raises from a drift in this mine at Cornucopia. George W. Boggs is manager.

CLACKAMAS COUNTY.

Financial Mining Co.—It is announced that this company will spend $16,000 in developing its four claims in the Bald Mountain district.

COOS COUNTY.

Divilbiss.—A new separator and other machinery have been installed on this group.

DOUGLAS COUNTY.

Vesuvius.—An electric lighting plant is to be installed in this mine in the Bohemia district. F. J. Hard is the manager.

JOSEPHINE COUNTY.

Benton.—A 40-stamp mill is contemplated for this mine at Mount Reuben. Reuben Jones is manager.

Oregon Belle.—It is reported that a 10-stamp mill will be erected at this mine on Forest creek. Harry Foster is superintendent.

Takilma Smelter.—This smelter is in successful operation, and has been running day and night since it was blown in.

UNION COUNTY.

Camp Carson.—These placer mines, 25 miles west of La Grande, have been sold to California capitalists for a reported price of $15,000. The Camp Carson Consolidated Hydraulic Mines Co. has been formed to work its property. James Elmendorf is manager.

PENNSYLVANIA.

ANTHRACITE COAL.

Cross Creek Coal Co.—This company is preparing to remove the immense bed of coal lying between Drifton and Lattimer.

Lehigh Coal Co.—About 1,200 wagonloads per day are hoisted from this company's Packer No. 4 colliery at Mt. Carmel. The daily shipment averages 3,300 tons.

Reliance Coal Co.—This company's new breaker at Wilkes-Barre is ready for use, but its operation is delayed pending the building of a switch by the Lehigh Valley railroad.

Scranton Coal Co.—The sinking of the main shaft at this company's mine has been resumed after a suspension of several weeks. The walls have been lined with concrete to their present depth.

BITUMINOUS COAL.

International Coal Mining Co.—This company has brought suit against the Pennsylvania Railroad Co. to recover $22,898, which it claims it was entitled to receive as rebates upon coal shipped by it from the Clearfield district.

Irondale Coal Co.—This company has consolidated with the Irondale Mining Co., as the Ohio Coal & Fire Clay Co., with a capital of $300,000, and headquarters at Pittsburg. The company owns about 1,400 acres of coal land.

Monongahela River Consolidated Coal & Coke Co.—The Fayette City mine of this company has resumed operations after an extended idleness; about 300 men are employed.

Pittsburg Coal Co.—This company has purchased 419 acres of coal land in Amwell township at a reported price of $41,900.

UTAH.

(*From Our Special Correspondent.*)

JUAB COUNTY.

Tintic Ore Shipments.—During the week ending October 15 shipments were 103 carloads, as follows: Bullion-Beck, 6; Centennial-Eureka, 25; Eagle & Blue Bell, 10; Gemini, 42; Grand Central, 4; Godiva, 3; Mammoth, 7; May Day, 1; Uncle Sam Consolidated (Concentrates), 3; Victor Consolidated, 1; Yankee Consolidated, 1.

Utah.—It has been decided to sink the main shaft to 1,000 ft., the 800-ft. level being the lowest workings now. A larger hoisting plant and pumping machinery will be required. George Crismon, of Salt Lake, is president of the company.

Jumbo.—Active development is being carried on at this property. The tunnel has been completed a distance of 250 feet.

SALT LAKE COUNTY.

Bingham Consolidated Smelter.—The fifth furnace will be completed and ready to go into commission in about a week. Shipments of copper bullion during the week ending October 15 aggregated about 300,000 pounds.

FOREIGN MINING NEWS.

AFRICA.

TRANSVAAL.

The gold production in September is reported by the Transvaal Chamber of Mines at 312,286 oz. fine, which is only 9 oz. more than in August, but 36,089 oz. more than in September, 1903. For the nine months ending September 30 the total production was 2,123,331 oz. in 1903, and 2,747,616 oz. in 1904; showing an increase of 624,285 oz., or 29.4% this year.

AUSTRALIA.

WESTERN AUSTRALIA.

The gold production in September is reported at 198,449 oz. bullion, a decrease of 2,954 oz. from September, 1903. For the nine months ending September 30 the total was 1,770,429 oz. bullion, against 1,842,282 oz. in the corresponding period last year, a decrease of 71,853 oz. The bullion reported this year was equal to 1,479,732 oz. fine gold, or $30,587,068 in value.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending October 8 were as follows, in tons: Granby, 10,350; Brooklyn, 1,570; Mother Lode, 4,500; Emma, 1,243; Oro Denoro, 132; Mountain Rose, 99; Athelstan Jack Pot, 58; total for week, 17,952 tons; total for year to date, 618,139 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending October 8 were as follows, in tons: Le Roi, 2,525; Centre Star, 1,440; War Eagle, 1,110; Le Roi No. 2, 750; Jumbo, 300; Velvet, Portland milled, 50; Whitebear milled, 100; View, 30; total, 6,305 tons. Year to date, 269,607 tons.

MEXICO.

SONORA.

Greene Consolidated Copper Co.—At the annual meeting of this company in New York the following new directors were elected: W. D. Cornish, Anton Eilers, W. B. Devereaux, James Phillips, Jr., W. T. Van Brunt and Silas W. Eccles, to succeed Henry F. Blount, Chas. Adsit, George L. Robbins, J. B. Showalter and T. H. Anderson. The following old directors were re-elected: W. C. Greene, Mark J. Sperry, E. B. Tustin, H. E. Huntington, Henry Ollesheimer, Myron M. Parker, Gilbert B. Perkins, Epes Randolph, Edward C. Rice, Alfred Romer, Galen L. Stone, W. B. S. Thorne, Jacob Wiedman, L. C. Weir and Emil Berolzheimer. The old officers were re-elected. The monthly circular reports that the bullion production of the company for the month of August was 5,156,225 lb., containing 5,076,000 lb. of electrolytic copper, 55,462 oz. silver and 382 oz. gold. During the month of August the company sold 5,875,000 lb. of copper at an average price of 12.671c. per lb. The total cost of copper f. o. b. Cananea for the month of August was 8.96 cents per pound. The dividend of $259,200, payable October 28, makes an aggregate of $1,429,600 declared in dividends by the company to date.

MINING STOCKS.

(Full quotations on pages 654 and 655.)

New York. Oct. 19.

The stock market continues to broaden, and the eagerness of public buying offsets the profit-taking of professional operators. New high prices for the year are being made, and a feeling of security that better things may be expected has been instilled by the reports that insiders are giving able support to the market. A good example of the upward movement is United States Steel, its common stock advancing to $22.75, and preferred to $83.75, prices that have raised the valuation of the property over 20 per cent in six months. Amalgamated Copper is also on the wing, rising to $65.875, the highest price this year, and an advance of over 50% since last February. Anaconda was quiet at $24.75@$25.25. Greene Consolidated rose to $21, and since it has been listed on the Boston Exchange attracts less attention on curb. Tennessee is now quoted at $33, or $8 above par. British Columbia copper stands at $4.50@$5.50. White Knob, of Idaho, continues weak, selling down to 62.5c. per share.

Further strength has been shown in American Smelters, the common stock again touching a high point at $68 after a month's fluctuation. The preferred shares changed hands up to $110.

Ontario Silver, of Utah, brought $4. An effort has been made to interest curb brokers in Tonopah, of Nevada, by offering between $8 and $9.

Colorado shares are quiet. Elkton, of Cripple Creek, continues to sell at 63c., and Isabella at 21c., while Small Hopes, of Leadville, reappeared at 28c.

The Comstocks are a little firmer, Consolidated California & Virginia gaining 10c. at $1.75, while Ophir stood at $2.40@$2.45, and Mexican at $1.25. Silver Hill, the Nevada dividend payer, moved at 54@55c. per share.

Boston. Oct. 18.

(From Our Special Correspondent.)

Although there has been a very active market in mining stocks the past week, few shares are selling at better prices than a week ago. New York is reported as being a big factor in the local market, and big buying orders were placed in United States and Bingham particularly. Some of the so-called prospects have also been in better request, but as a rule, prices are lower for the week. The market has been broad and the most active seen for almost two years, and with the tremendous profit-taking, shows wonderful vitality. It is expected that there will be another upswing that will carry prices much beyond current quotations. The bulls certainly have the argument, for with a higher price for the metal, money is abnormally easy for this time of the year. The recent activity has not caused even a flutter in the money market.

United States Mining started Friday of last week at $21.87½, and easily rose to $23.62½ that day. The following day it touched $24.87½, and Monday it sold at $25.75, closing to-night at $25, a net advance of $3.12½ for the week. Trading in it has been extremely heavy, with over 10,800 shares on Monday alone. Current report is that the Lewissohns have been large buyers for American Smelting interests, and one report is that these interests offered $35 a share for a controlling interest, which is held by a few people. The private smelters in the Bingham camp have given the Smelters people some sharp and unwelcome competition in the matter of custom smelting, and the recent buying is believed to foreshadow an alliance of some kind. The late offering of 28,750 shares of United States Mining stock was taken by the large holders, as there was no profit in the transaction at the time. Net earnings for September were about $90,000, against $107,000 for August, and only $30,000 in July. October is expected to foot up over $120,000. The new Mammoth property, in California, lately taken over, is expected to add from $40,000 to $50,000 revenue per month.

Bingham advanced $2.50, to $31, closing a fraction below this. The Smelters people are said to have large holdings of this stock. This mine is earning about $25,000 net per month, and, under agreement, will do less custom work, and treat more of its own ores. Mohawk was taken in hand to-day and advanced to $51.37½, closing at $51, against $47.75 a week ago. Trinity also took on a lease of life, touching $9.37½ Monday. It is thought that some sort of a deal will be made for the joint ownership of a smelter in this mine's territory. United States Coal & Oil stiffened to $11.75 on the annual report, which shows a balance of $508,511 on hand September 30, an increase of $93,440 for the year. The income was $440,196, and expenses $478,706. The cash on hand October 1 was $519,369, and with a balance of $163,178 unexpended on the railroad, a total of $682,548.

Allouez Mining closed at $12.62½; Atlantic at $14; Centennial at $27; Isle Royale, $21.50; Michigan at $8; Old Dominion at $20.87½; Otcober 1 was $519,369, and with a balance of $41.37½; Wolverine at $96.50; Calumet at $555. In most cases these are the lowest of the week. Copper Range advanced to $62.50 on a fair amount of business. Greene Consolidated was put on the regular list Monday and touched $21.12½ that day.

Colorado Springs. Oct. 14.

(From Our Special Correspondent.)

Trading in Cripple Creek shares on the local exchange has been quite active during the past week, with a number of stocks scoring gains, and with El Paso, the Beacon Hill stock, the rocket of them all, advancing from $1.05 of one week ago to $1.20½. The present fine showing of the property, together with the doubling of the monthly dividend, seems to be the cause of the sudden rise. There is some talk of the construction of a drainage tunnel on the south slope of Bull Hill, El Paso drainage tunnel having accomplished so much for the mines of this district.

Salt Lake City. Oct. 15.

(From Our Special Correspondent.)

There is a decided improvement noticed in the mining stock market this week. The leading feature was furnished by May Day, the Tintic mine which has come to the front with what appears to be the most important strike in its history. Less than six weeks ago the stock was a drug on the market around 2½c. a share, while this week's business closed with it strong around 27c. The opening sale of the week was made at 14c. Consolidated Mercur made some advances and closed stronger. Good reports continue to come from both the mine and mill. The announcement of the change in the management of the Daly-West company did not have a strengthening effect, but the contrary. The retirement of the officers who have so long directed the affairs of the company is taken as an indication of weakness. Some Daly-Judge stock has changed hands at about last week's prices.

Columbus Consolidated, it is claimed, has a considerable short interest. The owners of about 300 shares failed to pay the late 20c. assessment, and stock enough was sold to meet the amount due, the average price paid for it being about $1.60 per share. This will leave the company practically free from debt.

San Francisco. Oct. 13.

(From Our Special Correspondent.)

The sharp rise in the Comstocks, which was noted last week, was followed by a reaction. Nearly all the stocks went down in the absence of sufficient support from buying orders. Apparently, the public did not put much trust in the permanence of the advance or in the news which was behind it. The market this week, in consequence, presents a very uneven appearance.

Some quotations noted are: Ophir, $2.50; Consolidated California & Virginia, $1.80@$1.90; Mexican, $1.35; Best & Belcher, $1.25; Hale & Norcross, 64c.; Silver Hill, 57c.; Savage, 35c.; Sierra Nevada, 38c. per share.

The San Francisco Stock & Exchange Board has decided to list about 25 of the principal Tonopah and Goldfield stocks. They were called for the first time to-day. As a result of this action, several brokers have given up their membership in the Tonopah exchange and gone over to the older organization.

On the San Francisco & Tonopah exchange sales were rather light in volume, but prices were generally steady. Montana Tonopah sold at $1.97; Jumbo, 73c.; Tonopah Midway, 48c.; Red Top, 16c. per share.

On the California exchange dealing in oil stocks was only moderate, and prices were rather weak. Twenty-eight was quoted at $10; Caribou, $4.50; Oil City, 55c.; Junction, 3c. per share.

Monterey. Oct. 5.

(*From Our Special Correspondent.*)

Exchange on New York, though dull, has advanced from 215.625 to 216.5.

Mining stocks are very quiet, the only transactions reported being Dos Estrellas at $2,420, due to a reported strike; Aldebaran, $60; Reforma, $27; Santa Maria de Guadalupe, Zacatecos, $80; Barreno, $85; La Paz, $210, and Santa Gertrudis, Pachuca, $74.

COAL TRADE REVIEW.

NEW YORK, Oct. 19.

ANTHRACITE.

There is considerable speculation in the trade over the forthcoming hearings in the suit against the anthracite railroads before the Interstate Commerce Commission in this city, this speculation being chiefly over the motives that have led the plaintiff's attorney to petition the Commission to hold hearings in Chicago, and then assent to their being held in New York. Apparently the taking of testimony is purely part of the plaintiff's campaign of publicity for himself. He may care whether or not the anthracite railroads have combined in an illegal manner to oppress the public, but there is nothing to prove that he cares, except the sensational statements of his newspapers. Now it would seem that his attorney wished to try to show that an organization of sales agents and dealers in Chicago was directly controlled from the New York and Philadelphia offices of the anthracite roads, that Mr. Baer had as much to say about Chicago as about tidewater prices, and that the coal trust oppressed the West as well as the East. The transfer of the hearings to New York may be connected with the plaintiff's candidacy for Congress from a New York district and his desire to use every means he can to increase, for obvious political reasons, the size of his majority. These reasons would also account for the hearings being held just at this time. It seems altogether unlikely that the plaintiff's attorney will elicit much evidence in support of his nominal contentions, but, undoubtedly, the plaintiff's newspapers will use some startling head lines, and the plaintiff will have shown his position as a friend of the common people.

Regarding the report of a change in the Reading's policy toward its locomotive fuel, its using small sizes of anthracite instead of bituminous, there is reason to believe that the report is true, as it will undoubtedly benefit the company. There can be no question of the advantage of using such small stuff as No. 2 and No. 3 buckwheat for locomotive fuel, charged to the railroad department at a nominal price, instead of preparing it, carrying it to tidewater and selling it there for what Mr. Baer says is less than cost. The reason for the substitution during recent years of bituminous coal for the small anthracite sizes of the Lehigh Valley and the Delaware, Lackawanna & Western, as well as the Reading, is probably to be explained by certain officials comparing the prices of bituminous with the prices of anthracite at certain points, and thus making an apparent saving rather than by considering what would be best for the company's property as a whole. That is, the change from anthracite to bituminous coal was probably due to the influence of a purchasing agent, and the Reading's change back to anthracite would indicate that the fuel agents' views are to be subordinate to those of some one higher up—possibly Mr. Baer himself.

The anthracite trade as a whole is distinctly on a weather basis; such warm days as those of this week check retail buying, and thus affect the wholesale markets. Still, everybody knows that winter is approaching, and cold weather may come unexpectedly soon. Hence, there is a general disposition in the wholesale trade to be prepared for eventualities, and, consequently, wholesale buying has not been restricted as much as might seem natural by the unseasonably high temperatures. Business at seaboard points, where most dealers have full yards, continues quiet.

In the Northwest there is a little better demand from small yards, and the movement of coal by rail from docks at the head of the lakes is increasing. In Chicago territory the demand for coal during the week has been light, and buying by out-of-town dealers has been irregular. The total lake receipts at Chicago to October 1 this year are about 300,000 tons less than to the same date last year. Rail receipts also have shown a falling off. Along the lower lakes and in Canadian territory the situation shows little change, and the market is quickly influenced by any change of temperature. Along the Atlantic seaboard buying is better at some points, and no stronger at others. Thus, at Boston and New York demand has been light, while at Philadelphia a little improvement, weather conditions considered, has been reported.

The small steam sizes are moving off a little more freely, now that manufacturing establishments feel that the business outlook is improving, and that it will be well for them to keep coal on hand. Increased buying from the steam-heating trade, of course, is slight, with weather conditions what they are. Prices for these sizes are nominally maintained by all the large companies, but individual operators sell for considerably less than company quotations. Pea size seems to be in least demand, and only the smallest size, buckwheat No. 3, is much wanted. The company price for that size is $1.35, f. o. b. New York harbor shipping port, while the market price is $1.30@$1.35, the freight rate from the mines being $1.10. The market price of No. 2 is $1.45@$1.60, the company quotation being $1.60@$1.85. On No. 1 buckwheat the difference between company and individual prices is even greater. At Port Reading and Perth Amboy this size is quoted at $2.45 for free-burning and $2.20 for hard, while the coal of independent producers can be had for $2.05 for free-burning and $1.90 for hard.

BITUMINOUS.

In the Atlantic seaboard bituminous trade conditions are as they have been for several weeks. The recent drop in coastwise freight rates, following the termination of the coastwise agreement, has demoralized the vessel market. The rates are now on a basis of 50c. from New York harbor to points around Cape Cod, and a rate of 60c. from Philadelphia to Boston on large craft has been paid. The Coastwise Carriers' Association, it will be remembered, was organized for two purposes: first, to secure the higher rates which vessel owners claimed were due them as the result of paying more for wages and supplies; secondly, and chiefly, to a desire to obtain more equitable treatment at loading docks. Schooners going to Norfolk and Newport News to load took no cargoes, and their owners felt that the vessels should not be deprived of prompt loading, because of the arrival of large steamers in the export trade. These steamers were usually given the preference, and a schooner might lie for a week or so before loading. Now that the association agreement has run out, having proved of no effect in advancing rates, and vessel owners are bidding for a share of business from the Virginia capes, the railroads are reported to be giving preference to those owners who supplied tonnage during the summer. The break in coastwise freights, though sharp, already shows sign of recovery, and the first severe storm will doubtless cause a decided advance.

Trade in the Far East shows some improvement, largely on account of the lower freight rate. Stocks on hand in that territory are reported as still light. Along Long Island sound there has been no decline from the improved conditions noted last week. Trade at New York harbor points continues steady on the basis that has prevailed for some time. Current prices are $2.40@$2.50 for ordinary grades of Clearfield, f. o. b. New York harbor shipping ports. The specialties sell as high as $3.25 and gas slack as low as $2.20. There has been further improvement in the all-rail markets.

Transportation from the mines to tidewater is rather slow, and somewhat irregular. Car supply at the mines is up to all demands on some roads and short on others. In the coastwise vessel market large craft are in plentiful supply, and rates are low, though improving. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island sound, 50c.; Boston and Salem, 55c.; Portsmouth and Portland, 60c.

Birmingham. Oct. 17.

(*From Our Special Correspondent.*)

The strike of the union coal miners in Alabama, which began July 1, is still on. Coal is being mined, however, at almost every mine affected by the strike, though not in as great quantity as before. The several operators fighting the union and making effort to have the "open shop" at the mines are still bringing in large numbers of non-union men. There is much coal being mined at non-union mines, and mines with temporary contracts with the union men. The operators have advanced the mining wage of their non-union miners, now paying the regular scale price. During the coming month, November, all union miners at work will be entitled to an advance of 5c. per ton on their mining wage by reason of the advance in the pig iron quotations in this State.

The leaders of the miners are not discouraged at the continuation of the strike. Large quantities of provisions are being distributed to the striking miners, financial asisstance being received in abundance from the National organization and from the union miners who are working. A number of men out on strike in this State are working for smaller wages at other trades, and at the same time accepting the provisions being distributed by the miners' organization to make up the difference. President Ed. Flynn, of the miners' organization in Alabama, states that he has information that the operators are losing almost as many men as they bring in daily to take the places of the union men. He says that non-union men are being brought here under promise of being given employment in saw-mills or in mines, where there are no labor troubles. Operators state that as far as they are concerned, the strike is a matter of the past and that "open shop" will prevail at the coal mines in the future.

Good prices prevail for coal in Alabama. Several of the non-union mines are selling their coal to the furnace operators. The Sayre Mining Co. is furnishing almost all of the coal being used by the Republic Iron & Steel Co. in the operation of two furnaces and the Birmingham rolling mills. The Pratt Coal Co. has some strong contracts on hand. The railroads, foundries and other large consumers of fuel are having but little trouble in getting their full supplies of coal.

New mining corporations formed in Alabama in the last few months are now preparing to start up actual work. By November 1 two new companies in Walker county expect to be getting out coal regularly.

A good quality of coal has been discovered in Cullman county, north of Birmingham. The discovery was made some distance from a railroad line, but it is believed that a branch line can be constructed to the place where the coal was found, and there may be developments.

Coke production is on the increase, as several of the companies continue to light up more and more ovens every week, the intention being to increase the coke output sufficiently to stop the importation of the article from the Virginias.

Chicago. Oct. 17.

(*From Our Special Correspondent.*)

In general terms the wholesale coal business in Chicago territory may be said to be better than it was a week ago, and sales for the last week have been indicative of a firmer market. This applies to both anthracite and bituminous, though the market for bituminous is much more uncertain than that for anthracite. Sales of anthracite continue to increase slowly but steadily, and if they are not so large as those of a year ago, they show an increasing appreciation by country and city retailers of the desirability of getting a good stock of anthracite before snow flies. Trade outside of Chicago is better than trade within the city, the demand being especially good from the northwest. A wave of cold weather over the upper Mississippi valley will mean a much greater demand for anthracite.

The market for bituminous has been firm to encouraging, the condition of western being somewhat better through the restrictions of shipments of fine coals. Such shipments have

not for a month paid more than the freight to shippers, and it will apparently take two or three weeks more to clear the market sufficiently to restore a healthy tone and normal prices again for fine western bituminous. Steam coal from the mines of Indiana and Illinois has sold well, though there has been close competition, due to the large amount being mined in comparison with the amount that the market is able to consume. Brazil block brings $3@$3.10; Indiana and Illinois lump is $1.65@$1.75, and run-of-mine is quoted at $1.50@$1.70.

Of eastern, bituminous Hocking sells well and seems likely to advance; it is quoted at $3, as heretofore. Smokeless is somewhat hampered by a shortage of cars, and the demand continues good; smokeless undoubtedly is increasing in popularity; it is quoted at $3@$3.10, and in the last week has sold well up to these quotations. Youghiogheny has been in somewhat abundant supply and has sold at $2.80@$3 per ton.

Cleveland. Oct. 18.

(From Our Special Correspondent.)

The coal trade has picked up considerably during the past few days. There has been better buying in most quarters, and the prices are stronger. The improved industrial situation through this territory has resulted in an extended buying of steam coal, both for immediate need and on contract, and many operators are disposed to hold for higher prices on long-time contracts. Some of the mines are now asking as high as $1.10 at the mines, run-of-mine grade, and the bottom price now is about $1.05 at the mines, for both Pennsylvania and Ohio coals. There is also a better demand for slack. Prices are much stronger than they have been, with most operators asking 40c. at the mines for this material. On contracts the prices are going as high as 60c. at the mines. There is a better demand for domestic coal, but the prices are steady, and no advance is now expected. The competition between coal and gas is strong, and the sources of supply have been multiplied, which tends to keep the prices down.

The improved situation in pig iron has brought about better buying of coke, on which prices have been strong. The market appears to be a great deal broader than it has been for some time.

Pittsburg. Oct. 18.

(From Our Special Correspondent.)

Coal.—All the railroad coal mines in the Pittsburg district are in full operation to-day, but this is customary for the first three days in the week. About Thursday of each week the supply of railroad cars begins to fall off and mines are forced to close. The trouble was not as severe at the close of last week as the previous week. Demand continues heavy and prices are firm. Run-of-mine coal is still quoted at $1.05@$1.10 a ton at the mine. Many of the river coal mines have resumed operations, and it is likely that all will be running full before the end of the month.

Connellsville Coke.—The production for the week was about 5,000 tons greater than the previous week, but the shipments were less. Prices are much firmer, furnace coke being quoted at $1.50@$1.60, and foundry at $1.90@$2.10. The production for the week amounted to 222,678 tons, and the shipments to 8,680 cars, distributed as follows: To Pittsburg and river points, 3,302 cars; to points west of Pittsburg, 4,063 cars; to points east of Everson, 1,315 cars.

San Francisco. Oct. 13.

(From Our Special Correspondent.)

The trade shows little change. There is more activity in domestic coals, but steam coal, especially Australian, is rather dull. Prices show no change.

For Pacific Coast coals in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are ex-ship; Welsh anthracite, $13; Cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Oct. 19.

Foreign trade continues very quiet here, with little, or nothing, new to report.

According to a recent consular report, two or three years ago, the Dominion Coal Co., of Sydney, Cape Breton, shipped a cargo of coal to Sweden to be used as an experiment on government railways. The experiment proved such a success that the company now ships some 25,000 or 30,000 tons annually for general consumption in Sweden. This year the company is to make a further experiment in the foreign market by sending some coal to Mexico to be tested on railroads there. The first cargo, 5,000 tons, was recently shipped.

Imports of fuel into Germany for the eight months ending August 31 were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	4,362,301	4,469,082	I. 106,781
Brown coal	5,235,436	4,869,084	D. 366,352
Coke	284,671	337,677	I. 53,006
Totals	9,882,408	9,675,843	D. 206,565

The chief imports of coal were from Great Britain. The brown coal, or lignite, was all from Austria.

Exports of fuel from Germany for the eight months ending August 31 were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	11,199,947	11,487,691	I. 287,744
Brown coal	15,531	14,757	D. 774
Coke	1,678,734	1,800,284	I. 121,550
Totals	12,894,212	13,302,732	I. 408,520

The chief exports of coal were to Austria, Holland, Belgium, Switzerland and France; of coke, to France, Austria and Russia.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of October 8, that the market remains very dull and quiet throughout. Quotations are: Best Welsh steam coal, $3.54; seconds, $3.36; thirds, $3.24; dry coals, $3.30; best Monmouthshire, $3.18; seconds, $3.12; best small steam coal, $1.98; seconds, $1.74; other sorts, $1.62.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market continues dull and unchanged. Some rates quoted from Cardiff are: Marseilles, $1.20; Genoa, $1.14; Naples, $1.14; Las Palmas, $1.32; St. Vincent, $1.44; Rio, $2.04; Santos, $2.46; Buenos Aires, $1.68.

IRON TRADE REVIEW.

NEW YORK, Oct. 19.

The iron market in all directions shows increasing firmness and activity. Coupled with this, however, is an evident disposition on the part of makers to put up prices, possibly to an extent which may serve to check the buying movement, though this remains to be seen.

As would naturally be expected, the movement is manifested first in raw materials. Concessions are no longer offered on pig iron, and makers are even declining to accept current prices for deliveries running over the current quarter. They are disposed to ask higher prices for 1905 deliveries. The southern ironmakers are holding back for higher prices, and have already made a general advance of 50c. on No. 2 foundry, while some furnaces ask more.

In finished material, there are also signs of better demand, including many inquiries for structural material. It is reported also that orders for rails are better, though it is said that the business now going to the mills is largely for export.

Pig Iron Production.—Reports from producers show that the weekly capacity of the coke and anthracite furnaces in blast on October 1 was 310,000 tons, an increase of 18,500 tons over that reported September 1. The highest active weekly capacity reported this year was 368,250 tons, on May 1; the lowest, 185,650 tons, on January 1. Taking the report of the American Iron & Steel Association for the first half-year and the estimate of the *Iron Age* for the third quarter, and including the charcoal furnaces, we find that the output of pig iron for the nine months ending September 30 was, approximately, 11,903,500 tons. Unsold stocks reported on October 1 were 555,400 tons, showing a decrease of 75,400 tons during September. These figures do not include pig iron held by the steel companies for their own use.

Birmingham. Oct. 17.

(From Our Special Correspondent.)

The Alabama pig iron market is in a better condition than it was last week, when a decided improvement was noted. The furnacemen in this section are looking for another advance in quotations of not less than 50c. per ton, and one company at least is holding for $10.50 per ton for No. 2 foundry. The smaller producers of iron in this district have sold ahead as much as they desire to. One large interest is said to have quite a quantity of iron in their yards, but is holding it for an advance.

The Tennessee Coal, Iron & Railroad Co. during the past week blew in another of the bessemer furnaces, being two in operation at that place, making an average of 400 tons iron a day. Little Belle furnace at Bessemer, belonging to the Tennessee Co., is being repaired, while the fourth furnace needs little work before it can be started up. With furnaces in operation slated to start up early in November, the iron production in this State will have gone above the normal output. Production is not much under what it was the first of the year, and before the general plan of curtailment and the miners' strike began.

J. W. McQueen, second vice-president of the Sloss-Sheffield Steel & Iron Co., when asked this week as to market conditions, said: "Iron is in good demand. The market is firm, with No. 2 foundry at $10. Even at that price there is not any too much iron offered on the market."

The following quotations are given in this district: No. 1 foundry, $10.50; No. 2 foundry, $10; No. 3 foundry, $9.50@$9.75; No. 4 foundry, $9.25@$9.50; gray forge, $9@$9.25; No. 1 soft, $10.50; No. 2 soft, $10.

There is a large consumption of pig iron in this district. The United States Cast Iron Pipe Co. has purchased recently in large lots, having some excellent orders on hand for pipe, including the recent order from the Panama Canal Commission for something like 43,000 tons of pipe and fittings. The Dimmick Pipe Co., the Central Foundry Co., and several other foundries and rolling mills are consuming large quantities of pig iron.

The Birmingham rolling mills (Republic Iron & Steel Co.), which started up a week ago, are doing nicely, everything considered. The Bessemer rolling mill (Tennessee Co.), employing non-union members, continues to turn out a good quantity. The force at work in this plant has been augmented during the past few days with several batches of men from the north. The Sheffield rolling mill, a small institution manufacturing barrel hoops and wagon irons, has been in steady operation all through the summer, giving employment to 100 men. Mr. J. I. Johnston, connected with this plant, was in Birmingham the past week looking after two heaters and heaters' helpers for the mills, and he offered steady employment for some time to come.

Foundries and machine shops in this district are in fine shape, and their trade has picked up considerably of late.

At the steel plants in this section there is no change in the situation, the production being good and the demand steady. Mr. G. H. Shuler, general manager of the Alabama Steel & Wire Co., announces that the furnace and steel plant at Gadsden are in full blast, as well as the steel rod, wire and nail mills at Ensley.

Chicago. Oct. 17.

(From Our Special Corerspondent.)

In the pig iron market, as in other branches of the iron and steel industry, the local market is firm, and apparently will continue so for

another week. Sales have been fairly good, though not so large in the aggregate, or in individual lots, as the record of two or three weeks ago. The significant feature of the situation is that there is no backward movement; with all the competition there is a tendency to advance rather than to cut prices. This is due in part no doubt to confidence in the market by furnace agents, but legitimate trade conditions must be back of any such movement to insure its continuance. And to all appearances the movement is destined to grow.

Northern continues to be much in demand; so much so that the season may be called a profitable one for proprietors of northern furnaces. Trading is still largely restricted to the first quarter in 1905, and to deliveries of small lots before January 1, at premiums ranging from 50c. to $1. The spot-lot business, while not so large as it was six months ago, is a good one, and the man who has iron to sell before January 1 can find a profitable market for it in Chicago territory. Southern is not breaking, or in danger of breaking, apparently, notwithstanding the predictions that have been made since the beginning of the present little boom. Although northern is the favorite of many buyers, with prices so close as they are now, southern is selling well and inquiries are very encouraging.

The coke market is without significant change, $4.65 for 72-hour Connellsville being the quotation, and shipments appear to be well regulated to the demand, which is even, though not heavy.

Cleveland. Oct. 18.

(*From Our Special Correspondent.*)

Iron Ore.—The market has been stronger. The buying has been slightly heavier, and the producers have been trying to advance the prices to make up for a slight increase in the cost of carrying the ore down the lakes. The vessel-owners are now faring better than they have all summer, the ore being in better demand and the rates of carriage being more satisfactory. The market, for the first time in the year, is really strong.

Pig Iron.—The market has lost none of its strength, but has been gaining rather steadily. The foundry producers are not disposed to sell much more iron at the old prices, and are not trying to force their material on the buyers; they are rather trying to withhold it until the future market is better determined. Just now No. 2 foundry is selling at $12.25@$12.50 in the Valleys, while for the first quarter of next year $12.50 to $12.75 is demanded, and for the second quarter $13, as the minimum is not being entirely overlooked by the buyers. The strength here is added to by the fact that the southern furnaces are not a factor, having no material which they are offering for sale. Buyers of basic are finding the producers not quite so willing to sell as they have been, and the market faces a situation where the furnace-owners a short time ago were shut down, and now may turn around and refuse to sell anything further until they know what the future is to be.

Finished Material.—The bar iron situation has been stronger. Prices have advanced until 1.30c. at the mill is now the bottom, with most of the prices slightly higher. The reason for this has not been so much the better demand for bar iron as that the price of scrap has advanced, and the mills are finding themselves unable to meet the demands for bar iron at the old prices. Buying in sheets is a little easier. The demand for plates and shapes is getting to be extremely heavy, due to the rush in ship-building, which will keep all of the yards on the Lakes busy during this year. There has been improved buying in billets. The demand for rails is light. The whole market is steady.

New York. Oct. 19.

Pig Iron.—The market is decidedly stronger and the number of orders is increasing. Northern irons have advanced; Southern are not a factor in the market. For Northern we quote: No. 1X foundry, $15.25; No. 2X, $14.70; forge, $13.50.

Bar Iron.—The market is still dull. We quote refined bars at 1.445c. in carload lots delivered at Jersey City. Soft steel bars can be had for 1.40c.

Plate.—The demand is limited to orders for small lots. We quote 1.545c. for ¼-in. tank plate in carloads at tidewater, with other grades in proportion.

Steel Rails.—Quotations are still $28 for standard sections, f. o. b. mills in lots of over 500 tons. Quotations for light rails by the chief producing concern range from $18.50 for 40-lb. up to $22 for 12-lb., f. o. b. mills in large lots. Central Pennsylvania mills ask $21 for 40-lb. and $24 for 16-lb.

Structural Material.—Demand has not improved from last week. We quote on large lots at tidewater, 1.55@1.80c. for beams, angles and channels.

Philadelphia. Oct. 12.

(*From Our Special Corerspondent.*)

Each day brings some agreeable surprise to the pig iron people. Yesterday several unexpected orders were booked for forge iron. The mill people have been acting rather strangely, according to the opinions of furnacemen, in not buying more freely. Both large and small users of iron of all kinds are disposed to buy in a much larger way than they have been, and a number have done so; in fact, some of the largest contracts of the year have been placed within a week, in which basic iron has figured.

Several mill owners have closed arrangements for more than enough forge to see them into January. Only a moderate amount of business has been done in foundry, but there are movements now in progress which the foundry iron-makers think will result in their unloading, or rather contracting, for a good portion of their output for the first quarter of next year. The slight advance which has been made in some cases is not general, and is due to particular conditions. Some people want a certain kind of iron immediately, and they have to pay for it. Everything points to a higher range of prices next month. Quotations are about $15@$15.50 for No. 1 foundry; No. 2 foundry has sold as low as $14.25, but it is not an easy matter to get a good brand to-day even at $14.50 for early delivery, and as to late deliveries, our furnace people take the view that it is not good policy to sell their output for the winter at current quotations. Basic is $14.25@$14.50, and a big business is in sight.

Billets.—The fact that the mills have filled up rather suddenly has stimulated a number of buyers who have been hanging back for a month. Open-hearth steel has been sold at $22, but higher quotations have been asked within a day or so.

Merchant Bar.—The merchant bar mills are slowly picking up new business. A number of manufacturers are disappointed at the outcome. We had a week or two of activity, which has been followed by dullness.

Sheets.—The appearance of a few orders for large lots of sheets brought out some sharp competition, which raised the rumor that there was a reduction in sheet iron. The manufacturers say there is no reduction.

Merchant Steel.—The consumption of merchant steel, as compared with what it was three months ago, shows an improvement.

Plates.—Our plate people have been encouraged to believe that some of the larger buyers will be heard from very soon. They have been waiting for them anxiously for months.

Structural Material.—Not a single interesting item of news can be raked out to-day. Beams, channels and angles are quoted, 1.53½ to 1.65; small angles, 1.50.

Scrap.—The scrap yard men are saying "I told you so," and certainly they did. The buyers are now paying as much as 50c. a ton more for scrap, such as No. 1 steel and machinery scrap, than they could have bought a few weeks ago. The scrap men are selling off all the good scrap they have.

Pittsburg. Oct. 18.

(*From Our Special Correspondent.*)

There has been a stiff advance in pig iron prices, and still higher prices are likely to prevail before the end of the month. One large furnace interest to-day rejected offers of $12.25, Valley furnace, for bessemer iron. Sales at that figure were made this week in 1,000-ton lots only and for delivery during the rest of the year. Furnaces have refused to quote prices for shipment in the first quarter of next year, but it is understood that an offer of $13, Valley, for a large order would be accepted. Foundry and forge iron also have advanced, and 25c. to 35c. a ton has been added to the quotations of a week ago. The Bessemer Pig Iron Association has fixed $12.25, Valley, as the minimum price of bessemer iron for the rest of the year. It is evident that an active buying movement has started, but consumers are guarded in their negotiations, fearing that an unusually heavy demand will create abnormal prices, and inquiries are being carefully made. One consumer, who is known to require a large tonnage, to-day sent in an inquiry for 10,000 tons of bessemer iron for delivery this month, and 5,000 for next month. It is certain that the sale will be concluded before the end of the week, and that an additional order will be placed by the same interest. One furnace reported to-day the sale of 5,000 tons of bessemer, in 1,000-ton lots, at $12.25, Valley, declaring it would not sell more to a consumer at that price. Some furnaces have sold ahead and have no stocks on hand, while a number have large stocks, and all seem to be holding the iron for more remunerative prices. The low rates named during the past few weeks were on speculative iron. It is estimated that the inquiries received for gray forge aggregate over 60,000 tons, and that all will result in sales at good prices. Included in this is 25,000 tons for the second section of the Pennsylvania railroad tunnel. It was supposed to have been placed some time ago, but the deal has evidently fallen through. It is reported here that the Alabama furnaces have either withdrawn entirely from the market or have advanced prices about 50c. a ton. The production of pig iron for September exceeded August by 185,000 tons, and it is now certain that this year's output will not fall more than 2,000,000 tons below the output of the past two years.

The demand for finished steel products shows remarkable improvement, some large orders having been placed during the week in various lines, principally plates and structural shapes. The Jones & Laughlin Steel Co. booked 6,000 tons to be delivered at an early date, and the big plant of the company on the South Side is running to its capacity. The contracting firm of James Stewart & Co. has just received three large contracts, which will require from 5,000 to 8,000 tons of structural material. One contract is for a 20-story steel building in New York; another for a 12-story building in Norfolk, Va., and the third for a banking building in Baltimore. Additional steel car orders have been booked during the week. The Standard Steel Car Co. received a contract for 2,000 cars from the Erie railroad, 1,000 self-clearing hopper cars of 100,000 lb. capacity, and 1,000 flat-bottom, twin gondola cars of like capacity. The Pressed Steel Car Co. is said to have closed a contract for about 4,000 cars. It is reported that the three steel car builders—the Pressed, Standard and Cambria, now have orders on their books aggregating over 15,000 cars, which will keep them busy until the first of the year, and probably longer. The Howard axle works of the Carnegie Steel Co., at West Homestead, was put on double turn on Sunday night, and will be kept busy for some time turning out axles for the car companies. Some new orders for steel rails have just been booked by the Carnegie Co., and the Edgar Thomson works were put on double turn Sunday night. The light rail mill at the plant, which has been idle for a long time, was also started. Most of the new business received is believed to have come from foreign countries. The situation is better than it has been for months, and prices on finished products generally are firm. Everything indicates a favorable termination of the year and a good start for the new year. President W. E. Corey, of the United States Steel Corporation, and the presidents of the subsidiary companies of the corporation met here on Friday, and reports were presented of an unusually favorable character.

Pig Iron.—Prices have advanced, and sales of all grades of pig iron this week may exceed 25,000 tons. Sales of bessemer were made yesterday aggregating 5,000 tons, at $12.25, Valley furnaces, which is now the minimum for this year's delivery, and furnaces are refusing at present to quote prices for next year. Inquiries for gray forge are very large, and so far amount to fully 60,000 tons, and a number of important orders are likely to be closed this week. There is a good demand for foundry iron, and basic iron is reported to be scarce, being quoted almost as high as bessemer. The quotations for foundry No. 2 range from $13 to $13.25, Pittsburg, and gray forge is quoted at $12.25@$12.35, Pittsburg.

Steel.—Billets are held firmly at the pool price of $19.50, f. o. b., Pittsburg, and sheet bars at $21.50. There are some reports of shading, but none can be confirmed. Steel bars remain firm at 1.30c. for bessemer and 1.35c. for open-hearth. Plates are firm at 1.30c.@1.40c.

Sheets.—The sheet market is in better shape than it has been at any time within the past six months. Black sheets, No. 28 gauge, are firm, at 2.10c., and galvanized sheets remain at 3.10@3.15c.

Ferro-Manganese.—The demand is good, but prices are a trifle lower, and 80% domestic is quoted at $40.50@$41.50 per ton.

BY TELEGRAPH.

Pittsburg, Oct. 19.—The United States Steel Corporation is negotiating for the purchase of 400,000 tons of bessemer and basic iron, for delivery extending over a period of six months, as it intends to blow out six or seven of its furnaces. The Corporation is in consultation with other steel producers, and is suggesting the advisability of advancing the price of billets and sheet bars.

Effective to-day—October 19—the National Tube Co. decreases discounts on iron and steel merchant pipe by one point. This is equivalent to a general advance of approximately $2 per ton net.

Cartagena, Spain. Oct. 1.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Shipments for the week were two cargoes, 8,450 tons manganiferous ore, to Great Britain; one cargo, 2,100 tons dry ore, to Great Britain; one cargo, 3,850 tons magnetic ore, to Rotterdam. The market has shown some improvement in activity, but prices are no better. Tonnage is slightly more abundant, but rates continue firm, latest charters being at 6s. 6d. Cartagena to Glasgow, 6s. 9d. to Maryport, 7s. 6d. to Rotterdam, free dispatch, and 8s. 9d. to Rotterdam, full terms.

Quotations for iron ores are as follows, per ton, f. o. b. Cartagena: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus 6s. 6d.@7s. 3d.; specular ore, 58%, 8s. 6d.; magnetic ore, 60%, 10s. 9d. for lumps, and 9s. for smalls. For manganiferous ores, quotations vary from 9s. 3d. for 35% iron and 12% manganese, up to 14s. for 20% iron and 20% manganese.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton, f. o. b. Cartagena. Business is practically dead for the present.

CHEMICALS AND MINERALS.

New York, Oct. 19.

There is a good demand for most heavy chemicals, and a better feeling as regards the future. Further 1905 bleaching powder contracts have been booked on basis of quotations below, and it is understood certain consumers of chlorate of potash have been accommodated at 6.5c. per lb. for crystals. Acid contracts are comparatively few, and prices firm. Blue vitriol makers hold pat, anticipating an improvement in spring trade. Mineral paints are generally steady, although importers find competition growing.

The more important raw materials, like sulphur and nitrate of soda, are in good position. An increased consumption in this country, and the likelihood that the future visible supply in Chile will be less as a result of a smaller production than was originally agreed to, have combined to put prices at the highest point in a long time. The European situation, as outlined statistically below, promises to improve, as the sugar-beet and corn crops have shown a shortage in the current year, suggesting a larger planting in 1905.

The statistical position of nitrate of soda, in the nine months ending September 30, is shown below, in long tons:

	1903.	1904.	Changes.
S. Am. exports to Europe	679,610	731,183	I. 51,573
Imports	804,350	869,870	I. 65,520
Deliveries	980,740	949,500	D. 31,240
Loading for Europe, Oct. 1	146,804	128,895	D. 17,909
Visible supply, Oct. 1.	349,700	364,790	I. 15,090

Notable changes this year are a decrease of 3.2% in deliveries, and an increase of 4.3% in the visible supply on October 1.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

Brimstone, Domestic 2ds, long ton	$21.20
Domestic 99.5% long ton	21.50
(For Baltimore and Phila. add 25c.; Portland, 15c.)	
Foreign 2ds, long ton	21.50
Foreign 3ds, long ton	20.875
Pyrite, Am. 42@44%, lump, unit, at shipping port	10@10½c.
Am., fines, unit, at shipping port	8½@9c.
Spanish, 46@52%, lump, unit	10@11½c.
Spanish, fines, unit	9@10c.
Nitrate of soda, 95%, 100 lb	2.275
96%, 100 lb	2.30
Sulphate of ammonia, gas liquor, 100 lb	3.025@3.10
Phosphate, Fla. rock, 77@80%, f.o.b. shipping port	7.25@7.50
Fla. rock, 77@80%, c.i.f. Europe	10.53@11.70
Fla. land pebble, 68@73%, f.o.b. shipping port	3.75@4.00
Fla. land pebble, 68@73%, c.i.f. Europe	7.70@8.40
Tenn. 78@80%, f.o.b. Mt. Pleasant	4.00@4.25
Tenn., c.i.f. Europe	10.27@10.67
Tenn., 78%, f.o.b. Mt. Pleasant	3.75@4.00
Tenn., 75%, f.o.b. Mt. Pleasant	3.25@3.50
So. Car., land rock, f.o.b. Ashley River	3.25@3.50
So. Car., river rock, f.o.b. Ashley River	3.00@3.25
So. Car., river rock, c.i.f. Europe	6.33@6.56
Algerian, 63@70%, c.i.f. Europe	6.93@7.59
Algerian, 58@63%, c.i.f. Europe	6.15@6.60
Algerian, 53@58%, c.i.f. Europe	5.05@5.20
Tunis, c. i. f. Europe	6.33@6.50
Christmas isle, 80@85%, c.i.f. Europe	12.87@14.11
Ocean isle, 82@88%, c.i.f. Europe	13.60@14.45
Bleaching powder, prime, 100 lb	1.20@ 1.25
Cyanide, lb.	19@20c.
Copper sulphate, 100 lb	4.75@ 5.00
Nitric acid, 36°, 100 lb	4.75
38°, 100 lb.	4.75
40°, 100 lb.	5.00
42°, 100 lb.	5.50
Oxalic acid, com'l, 100 lb	5.10@5.50
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb.	1.05
60°, bulk, ton	18.00@20.00
66°, 100 lb.	1.20
66°, bulk, ton	21.00@23.00

Other products are quoted in the Wholesale Price Current, on page 656.

Liverpool. Oct. 4.

(*Special Report of Joseph P. Brunner & Co.*)

There is a very steady market for heavy chemicals. Soda ash in tierces is quoted as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash; ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s., net cash; bags 5s. per ton under price for tierces. Soda crystals are in fairly good demand at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda meets with a better inquiry at full rates, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for export to the Continent and a few other export quarters. Bleaching powder is well maintained at £4 15s.@£5 per ton, net cash, for hardwood packages, as to market. Chlorate of potash is quiet but firm at 3d.@3¼d. per lb., net cash, for English make, as to quantity and destination. Bicarbonate of soda is selling at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special quotations for a few favored markets. Sulphate of ammonia continues firm at £12 6s. 3d.@£12 10s. per ton, less 2½% for good gray 24@25% in double bags f. o. b. here, as to quality, with a fair trade passing. Nitrate of soda is strong and spot quotations range from £10 10s. per ton for ordinary, up to £10 17s. 6d. for best refined, for double bags, f. o. b. here, less 2½%.

METAL MARKET.

New York, Oct. 19.

Gold and Silver Exports and Imports.

At all United States Ports in September and year.

Metal.	September.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports	$998,076	$2,744,448	$41,536,851	$83,039,908
Imports	5,184,858	4,241,035	31,640,672	68,694,670
Excess	I. $4,186,782	I. $1,496,587	E. $9,896,179	E. $14,345,238
Silver:				
Exports	2,368,015	3,378,775	24,883,435	39,129,920
Imports	1,687,239	2,003,036	16,601,269	19,677,231
Excess	E. $680,776	E. $1,375,739	E. $8,282,166	E. $19,452,689

Gold and Silver Exports and Imports, New York.

For the week ending October 15 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	.....	$712,385	$555,759	$42,149
1904	$73,177,464	4,940,934	30,331,733	798,923
1903	31,438,290	6,609,994	23,384,536	3,075,090
1902	24,122,898	3,123,851	20,384,404	939,189

Exports of merchandise from the United States in September are valued by the Bureau of Statistics of the Department of Commerce and Labor at $134,267,115, which is $41,012,834 more than in August, and $23,902,275 more than in September, 1903. For the nine months ending September 30 the statement is as follows:

	1903.	1904.
Exports	$989 276,471	$985,470,972
Imports	758,798,236	751,376,116
Excess exports	$230,478,235	$234,094,856
Add excess of exports, silver		19,452,689
" " gold		14,345,328
Total export balance		$267,892,873

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending October 15, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$908,265,500	$1,134,013,400
Deposits	891,771,400	1,193,237,700
Circulation	45,723,200	42,288,000
Specie	171,870,800	237,745,000
Legal tenders	68,505,300	76,522,300
Total reserve	$240,376,100	$314,267,300
Legal requirements	222,942,850	298,309,425
Balance surplus	$17,433,250	$15,957,875

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'n.	$171,870,800	.....	$237,745,000	.....
England	161,849,090	.....	185,257,645	.....
France	486,898,635	$221,628,405	522,501,380	$220,489,020
Germany	162,765,000	57,190,000	146,055,000	51,320,000
Spain	73,120,000	98,215,000	74,040,000	100,640,000
Netherlands	20,134,500	31,599,000	27,474,000	30,276,500
Belgium	15,050,000	7,525,000	16,696,665	8,348,335
Italy	99,660,000	11,926,000	110,205,000	17,121,500
Russia	408,115,000	40,370,000	487,930,000	37,510,000
Austria	229,015,000	61,720,000	240,945,000	60,695,000

The returns of the Associated Banks of New York are of date October 15, and the others October 13, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has advanced in the last four days presumably under demand from East Indies Government; otherwise there is no new feature.

The United States Assay Office in New York reports receipts of 122,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to October 6 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£4,640,975	£7,749 498 I	£3,108.523
China	302,123	372,722 I.	70,599
Straits	721,879	58,103 D.	663,776
Total	£5,664,977	£8,180,323 I	£2,515,346

Receipts for the week were £50,000 in bar silver from New York, and £4,000 from Australia; total, £54,000. Shipments were £130,000 in bar silver to Bombay, £10,000 to Calcutta, and £2,500 to Madras; total, £142,500.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.46	$0.47½
Peruvian soles and Chilean pesos	.42	.43½
Victoria sovereigns	4.85	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

October.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
13	@13¼	@13	@12¾	59¾	28½	4.20	5.15	5.00
14	" 13¼	" 13	" 12¾	59¾	28¾	4.20	5.15	5.00
15	" 13¼	" 13	" 12¾	....	28¾	4.20	5.15	5.00
17	" 13¼	" 13¼	" 12¾	60¾	28¾	4.20	5.20	5.05
18	" 13¼	" 13¼	" 12¾	60¼	28¼	4.20	5.20	.05
19	" 13¼	" 13¼	" 12¾	60¾	28¾	4.20	5.20 @5.22½	.05 @5.10

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

October.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	October	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
13	4.85¼	57⅛	26⅜	17	4.85½	57⅛	26⅜
14	4.85¼	57⅛	26⅜	18	4.85½	58⅛	26⅜
15	4.85¼	57⅛	26⅜	19	4.8570	58⅛	26⅜

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Copper.—The market continues to display considerable strength. Business in all lines shows quite an improvement, and manufacturers are buying freely for early as well as future delivery. Under the circumstances prices show a further advance, the closing quotations being given as 13@13¼ for Lake copper; 13@13⅛ for electrolytic in ingots, cakes and wire-bars, 12¾@12⅞ for cathodes; 12⅝@12¾ for casting copper.

The market for standard copper in London, which closed last week at £59 17s. 6d., opened on Monday at £60 7s. 6d., and the closing quotations on Wednesday are cabled as £60 2s. 6d.@£60 3s. 9d. for spot; £60 5s.@£60 6s. 3d. for three months.

Statistics for the first half of October show a decrease in the visible supplies of 1,100 tons.

Refined and manufactured sorts we quote: English tough, £62 15s.@£63; best selected, £63 15s.@£64; strong sheets, £72@£72 10s.; India sheets, £70@£70 10s.; yellow metal, 6¼@6¾d.

Exports of copper from New York and Baltimore for the week ending October 18 were 2,149 long tons; also 12 tons ore. Imports at New York for the week of October 14 were 9 tons copper and $49,450 worth of ore.

Tin.—The continued manipulation of the market by London operators is frightening off consumers over here, who are proceeding very cautiously, and are only covering their immediate requirements. The closing quotations are given as 28¾ for spot and futures.

The London market, which closed last week at £130 12s. 6d., opened on Monday at £131 5s., advanced on Tuesday to £132 5s., and the closing quotations on Wednesday are cabled as £132@£132 2s. 6d. for spot; £130 12s. 6d.@£130 15s. for three months.

It will be noticed that the backwardation has become quite large, amounting to 30s. a ton.

Lead is very firm, with a good consumptive demand. The quotations are 4.20 New York; 4.12½ St. Louis.

The foreign market continues strong, Spanish lead being quoted at £12 5s.; English lead, £12 7s. 6d.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is strong and slightly higher. Missouri brands are selling at 4.15@4.20c., according to brand and delivery. Desilverized is nominally 4.12½c., but practically none is obtainable on that basis.

Spelter.—In sympathy with the improvement in the iron and steel trade, there has been a very good consumptive demand, and prices show a further advance. The closing quotations are given as 5.05@5.10 St. Louis; 5.20@5.22½ New York.

The foreign market is very strong and advancing, good ordinaries being quoted at £23 2s. 6d.; specials, £23 7s. 6d.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is strong and higher. Latest sales here are on a basis of 5.10c., and, as the market advances. demand seems to grow. Spelter to-day has more friends at the late advance than it has had at any time this year.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of October 1, that there has been no depreciation in prices, and demand continues active, with a strong competition among buyers. We still quote blende, 35% zinc, 67 pesetas per ton, and calamine, 30% zinc, 47 pesetas. Competition is so strong that blende as low as 26% zinc now readily finds buyers.

Antimony shows quite an improvement, owing to an attempt which has been made to corner the available spot supplies over here, which are comparatively small. The closing quotations are 7@7¼ for Cookson's; 6½@6¾ for Hallett's; 6¼@6½ for Hungarian, Italian, French, U. S., Japanese and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are higher, at $19.50 per ounce.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—Prices are low. In New York large lots have been offered at $40 per flask (75 lb.), with $41@$42 quoted for smaller orders. The San Francisco price is now $41.50 @$42. London price is £7 15s., with the same quotation from second-hands.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum.		Ferro-Chrom. (74%)	.12½c.
No. 1. 99% ingots	33@37c	Ferro-Tungsten (37%)	.45c.
No. 2. 99% ingots	31@34c	Magnesium, pure	
Rolled Sheets	4c. up	(N.Y.)	$1.60
Alum-bronze	20@23c.	Manganese, (98@99%	
Nickel-alum	33@39c.	N. Y.)	.75c.
Bismuth	$2.10	Manganese, Cu., (30@70%	
Chr'm'm, pure (N.Y.)	.80c.	N. Y.)	40c.
Copper, red oxide	.50c.	Molybdenum,'(98@99%	
Fe.-Molybd'm (50%)	$1.00	N. Y.)	$2.75
Ferro-Titanium (20@25%		Phosphorus, foreign	.45c.
N. Y.)	75c.	Phosphorus, American	.70c.
Ferro-Vanadium, (25%		Sodium metal	.50c.
N. Y.)	$3.00	Tungsten (best)	$1.25

Differences in price depend chiefly upon size and conditions of order.

Missouri Ore Market. Oct. 15.

(From Our Special Corerspondent.)

The teeter-board of zinc ore prices descended during the week, about an average of $6 per ton from the highest prices of the preceding week. The better grades of zinc ore sold early in the week on a basis of $40 per ton of 60% zinc, settling down to $39 at the end of the week, with second-grade ore selling on a $38 basis, and some less desirable ore going still lower. The highest price of zinc was $44 per ton, against a top price two weeks ago of $52.50. Apparently light buying characterized the fore part of the week, giving way to increased purchases later, with a consequently firmer market. Buyers asserted during the week that they were purchasing light, yet at the close it was shown that the purchases were 1,070 tons larger than the preceding week and 44 tons above the average of the year. This, too, with the Edgar Zinc Co. and the M. & H. Zinc Co. taking only half their usual purchases.

Lead continues to sell at $53.50 per ton, with a demand that takes up every pound produced each week.

Following are the shipments of zinc and lead from the camps of the Joplin district for the week:

	Zinc lb.	Lead lb.	Value.
Joplin	3,605,800	276,920	$79,520
Webb City-Carterville	1,513,740	409,140	38,080
Duenweg	865,120	270,910	25,550
Galena-Empire	933,060	108,730	19,620
Aurora	550,200	15,350	11,400
Oronogo	406,900	300	8,320
Alba-Neck	350,190	.....	7,350
Granby	471,000	56,000	7,150
Carthage	308,320	.....	6,470
Badger	261,140	18,660	6,200
Zincite	171,710	.....	3,430
Prosperity	112,320	24,710	2,780
Spurgeon	120,580	13,670	2,220
Sherwood	81,320	.....	1,750
Reeds	62,200	.....	1,310
Baxter Springs	54,360	3,680	1,190
Beef Branch	43,120	23,870	910
Diamond	43,150	.....	860
Totals	9,954,230	1,221,940	$224,110
Total year	414,320,330	52,800,280	8,501,900
Zinc value, the week,	$192,080;	42 weeks,	7,071,980
Lead value, the week,	32,030;	42 weeks	1,429,920

Sellers insist that they should have a $39 basis, but they would rather take that on a 7 to 1 schedule, with spelter at $5.55, than presume to hold the ore at so near an 8 to 1 schedule, as at present. Some smelters seem to feel that sellers are presuming upon arbitrary methods, and their course may have that semblance, but the other side of the question—of a price sufficiently remunerative to cover the capital investment, allow for stoppages, wear and tear, interest and the hazards of the business—must be given an equivalent consideration. Deeper mining, in harder ground, has changed the methods of mining all over the district. The expense of installing and maintaining machinery is each year growing greater as the requirements of the occasion demand increasing capacity to successfully mill ore showing a lower per cent of metallic contents. Placing the average cost of producing a ton of ore at $30, and figuring an average of 58% zinc, brings this result on the 7 to 1 schedule—$5 per hundred for spelter, $35 per ton of 60% zinc, or $33 per ton on an average. Allowing $3 per ton for a possible profit on an average output of 15 tons, amounts to $45 per week on an average investment of $25,000, or less than 10%. That will not do for a mining venture on the scale of operations in this district. Operators who pursue a strictly business policy figure out and understand these points, and that is why they insist on a $39 basis. Looking at the situation from a purely business view, the producers cannot be misrepresented as demanding an arbitrary price. It is merely an effort to raise the plane of prices on a par with increased cost, in order to encourage and foster the industry in this district. The smelters understand their side, and the producers think they understand their side of the situation. The two should get together—they have a common interest—and aim to keep the metal at a price that will stimulate rather than throttle the mining industry.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	28.33	28.845	4.075	4.347	4.865	4.863
Feb	29.43	28.087	4.075	4.375	5.043	4.916
Mar.	30.15	28.317	4.442	4.475	5.349	5.057
April	29.81	28.132	4.567	4.475	5.550	5.219
May	29.51	27.718	4.325	4.423	5.639	5.031
June	28.34	26.325	4.210	4.196	5.697	4.760
July	27.68	26.573	4.075	4.192	5.662	4.873
Aug.	28.29	27.012	4.075	4.111	5.725	4.866
Sept	26.77	27.780	4.243	4.200	5.686	5.046
Oct	25.92	.....	4.375	.....	5.510	.....
Nov.	25.42	.....	4.218	.....	5.038	.....
Dec	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	12.159	12.410	12.361	12.553	53.52	57.50
Feb	12.778	12.063	12.901	12.245	57.34	56.50
Mar.	14.416	12.299	14.572	12.551	63.85	57.321
April	14.454	12.923	14.642	13.120	61.72	58.247
May	14.435	12.758	14.618	13.000	61.73	57.321
June	13.942	12.269	14.212	12.399	57.30	56.398
July	13.094	12.380	13.341	12.505	56.64	57.256
Aug.	12.962	12.343	13.159	12.468	58.44	56.952
Sept	13.205	12.495	13.345	12.620	56 82	57.645
Oct	12.801	.....	12.954	.....	55.60	.....
Nov.	12,617	.....	12.813	.....	56.30	.....
Dec	11,952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan	25.62	55.56	21.98	47.57	26.423	57.055
Feb	25.41	55.09	22.11	47.89	26.665	57.592
Mar.	25.00	54.23	22.49	48.72	26.164	56.741
April	24.84	52.72	23.38	50.56	24.974	54.202
May	23.71	51.31	24.89	54.11	25.578	55.430
June	24.17	52.36	24.29	52.86	25.644	55.673
July	24.38	52.88	24.86	53.92	26.760	58.095
Aug.	24.23	52.52	25.63	55.36	26.591	57.806
Sept	23.88	51.52	26.75	58.00	26.349	57.120
Oct	23.40	50.57	27.89	60.36	.....	.....
Nov.	22.70	49.07	27.01	58.11	.....	.....
Dec	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Payable.	Rate.	Amount.
†Alaska Treadwell	Oct. 28	$0.37½	$75,000
†Am.Sm.& Ref., com.	Oct. 25	1.25	625,000
‡Anaconda Copper	Nov. 18	.50	600,000
*Annie Laurie	Oct. 15	.50	12,500
†Camp Bird	Oct. 31	.18	147,600
*Central Lead	Oct. 28	.50	5,000
Greene Con. Copper	Oct. 28	.30	259,200
*Home Oil, Cal	Oct. 15	.02½	2,500
†Iowa, Colo	Oct. 15	.01	16,667
Iron Silver, Colo	Oct. 31	.10	50,000
†Jamison, Cal	Oct. 18	.03	11,700
*Kendall, Mont.	Oct. 20	.05	25,000
*Lightner, Cal.	Oct. 20	.05	6,250
*Mines Co. of Am.	Oct. 20	.01½	30,000
N. S. St. & C., com	Nov. 1	3.00	150,000
N. S. St. & C., pf	Nov. 1	2.00	20,600
N. Y. & Hond. R.	Oct. 22	.10	15,000
*Pacific Coast Borax	Oct. 29	1.00	19,000
†Phila. Nat. Gas., com.	Nov. 1	.75	398,888
†Pittsburg Coal, pf	Oct. 25	1.75	519,771
Uncle Sam	Oct. 21	.02½	5,000

*Monthly. †Quarterly. ‡Semi-annually.

ASSESSMENTS.

Company.	Delinq.	Sale.	Amt.
Best & Belcher	Nov. 4	Nov. 25	.10
Big Casino, Cal	Nov. 12	.....	.03
Brunswick Con.	Nov. 3	.....	.03
Bullion, Nev.	Nov. 11	.....	.05
California, Utah	Oct. 12	Nov. 26	.06
Con. Cal. & Va	Oct. 31	Nov. 21	.25
Crown Point, Nev.	Nov. 9	Dec. 1	.10
Elsie, Utah	Oct. 12	Oct. 29	.00½
Golden West, Cal.	Oct. 28	Nov. 28	.01
Hale & Norcross	Oct. 31	Nov. 30	.10
Las Goteras, Mex.	Oct. 29	.....	.03
Marina Marsicano	Sept. 29	Oct. 31	.05
N. Y. Bonanza	Oct. 18	Nov. 7	.03
Orleans Con., Cal.	Sept. 15	Oct. 31	.07
Savage, Nev	Oct. 5	Oct. 26	.10
Solden, Cal	Nov. 2	.....	.10
South Eureka, Cal.	Oct. 29	.....	.02
Trade Dollar, Utah	Oct. 18	Nov. 9	.10
Tule Belle, Cal	Nov. 1	.....	.02
Union Con., Nev.	Nov. 9	Nov. 29	.10
West Comstock	Nov. 15	.....	.05
White Pine, Nev.	Oct. 21	.....	.20
Ybarra, L. Cal.	Oct. 29	.....	.05
Yellow Jacket, Nev.	Sept. 22	Oct. 27	.10

NEW YORK.

Company.	Par val.	Oct. 12		Oct. 13		Oct. 14		Oct. 15		Oct. 17		Oct. 18		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Acacia	1					.06								1,000
Amalgamated, C.	100	63½	62½	63⅜	62⅛	64¼	62½	64¼	64¼	65⅞	64¼	65½	64½	213,142
Anaconda	25	100¼	100	99½		101	99	100		101	100	99½	99½	3,300
Anaconda G.	5													
Andes	1													
Best & Belcher	3							1.20						200
Brunswick	1	.08		.08				.07		.07				1,600
Caledonia	1													
Challenge	1													
Chollar	2½					.22		.20						500
C. K. & N	1													
Confidence	3			.98										200
Con. Cal. & Va	2½			1.70		1.65				1.75				420
Con. Imperial	1					.02								1,000
Cripple Creek Con.	1			.09								.09		1,500
Crown Point	1													
Elkton Con	1					.63		.64	.63			.65		63
El Paso	1			1.20										500
Eureka	1					.35								35
Gold Sovereign	1	.07						.06						2,500
Gould & Curry	1							.21						200
Greene Con.	10	20½	20½	20½	20½	21	20½	21	20½	20½	20½	20½	20½	45,114
Hale & Norcross	3											.60		100
Homestake	100			55½		55½				55½				300
Horn Silver	20													
Isabella	1									.21				1,500
Justice	2													
Little Chief	50	.08												500
Mexican	3	1.50	1.30							1.25				500
Moon Anchor	5	.08		.08		.08		.08						2,500
Ontario	100					4.00								25
Ophir	3			2.45				2.30		2.45	2.40	2.35		800
Overman	1													
Pharmacist	1			.04				.04		.04		.04½	.04	4,000
Phœnix	1	.25	.22	.26	.25	.25	.23	.22		.23	.22	.25	.22	18,800
Portland	1			1.60								1.60		300
Potosi	1	.18	.17	.16										700
Savage	3					.34	.33			.30				600
Sierra Nevada	3			.34	.33									500
Silver Hill	1					.55	.54							300
Small Hopes	20			.35						.38				200
Tennessee C.	10	33⅛	33					33¼	32½	33		33	32½	820
Union Con.	1					.35				.40				500
Union Copper	25				⅛	⅛		¼		¼		¼		2,300
United Copper	100													
White Knob	10	1		¼	¼	¼	¼	¼		¼	¼	¼	¼	3,880
Yellow Jacket	1													

Total sales, 313,099 shares.

SALT LAKE CITY.*

Oct. 15

Company.	Par Val	High.	Low.	Sales.	Company.	Par Val	High.	Low.	Sales.
Ajax		$ .10	$ .10	100	Mammoth		1.90	1.80	250
Beck-Tunnel Con		.07¼	.07	3,000	May Day	$25	.27	.14	111,117
Carisa	$ 1	.11½	.11	7,600	N. Y. Bonanza	1	.02¼	.02	9,200
Century		.35	.35	100	Richm'nd-Anacon		.03½	.03½	2,000
Con. Mercur		.40	.38	5,850	Sacramento	5	.13	.12½	19,000
Daly		2.30	2.30	100	Silver Shield		.05	.04½	4,500
Dalv-Judge	1	4.45	4.35	1,050	Star Con	1	.14½	.14½	5,767
Daly-West	20	14.05	12.80	540	Tetro	1	.30½	.29	3,400
Eagle & Blue Bell		.80	.80	100	Uncle Sam Con	1	.30½	.23	18,186
Grand Central	1	4.00	3.95	200	Victoria		1.25	1.15	800
Ingot		¼	¼	1,000	Victor Con	1	.05	.03	5,000
Lower Mammoth		.07½	.05	1,200	Yankee Con		.36½	.34½	4,900
Little Chief		.03½	.01½	17,500					

*By our Special Correspondent. Total sales, 212,460 shares.

BOSTON, MASS.

Company.	Par val.	Oct. 12		Oct. 13		Oct. 14		Oct. 15		Oct. 17		Oct. 18		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adventure Con	$25			4		3¾		4		3¾	3¾	3¾	3½	735
Allouez	25	13	12½	13	12½	12½		13	12½	13	12	12½	12½	4,908
Amalgamated	100	63½	62½	63⅜	62½	64¼	63	64¼	64¼	65¼	64¼	65¼	64¼	28,877
Am. Z. L. & Sm.	25	13⅜	13	13½		14	13½	13⅜		14	13⅜	13½	13	1,585
Anaconda	25													
Arcadian	25			.85										50
Arnold	25	.60				60								500
Atlantic	25	14	13⅜	14	13⅜	13½		14	13⅜	14¼	14	14¼	74	2,675
Bingham Con.	50	28½	28½	29½	28½	30	29½	30½	29½	31	30½	30½	30½	17,469
Bonanza	10	.50				50						53		700
Boston Con.	5	6½	6½	6⅝	6½	6⅝	6⅜	6½		6½		6⅝	6½	3,240
Calumet & Hecla	25	550	540	550		552	546					555		112
Centennial	25	28	27	27½	27½	28	27½	27½	27½	27½	27	27½	27	4,257
Central Oil	25					7½				7½				200
Con. Mercur	5	.40		.40		.45	.40					.45	.40	7,285
Continental-Zinc	25							13	11			15		615
Copper Range	100	61½	61½	61½	61½	62	61	62	61½	62½	61½	62½	61	19,181
Daly-West	20	13½	13⅜	14	12	12½	12½	13	12½	14	13	13½	13½	1,398
Dominion C.	100									57				20
Dominion C. pf.	100													
Dominion I. & S.	100	14½	14½	14½	14½	12½	12½	14½	14½	15½	15	15½	14½	1,095
Elm River	12	2½		2½				2½		2½	2½			265
Franklin	25	8½	8½	8½	8½	8½	8½	8½	8½	9	8½	9		615
Granby Con.	10	4	3½	3½		3½		3½		3½	3½	3½	3½	10,165
Greene Con. C.	10									21½	20½	21	20½	5,608
Guanajuato Con.	5			1½	1½	1½	1½			2	1½	2	1½	4,725
Isle Royal Con.	25	22	21½	22	21	22½	21½			21½		21½	21	2,330
Mass. Con.	25	5½		5½	5½	5½		5½		5½	5½	5½		1,235
Mayflower	25	.60								.70	.60	70		285
Michigan	25	8	7½	8	7½	8	7½			7½		8		1,195
Mohawk	25	48	47½	48½	47½	48½	48	49	48½	50	49½	51½	49½	7,024
Mont. Coal & C.	25	6	5½	5½	5½	5½	5½	5½	5½	5½	5½			9,250
Mont. & Boston.	5													
Old Colony	25											1½		50
Old Dominion	25	21½	21¼	21½	21	22	21	21½	21¼	21⅜	21	21½	20⅞	2,706
Osceola	25	89	88	91½	88½	91	89½	90½	90	91	89	89½	89	3,150
Parrot	10	25		25		25½	25	26	25½	25½	25	25½		1,968
Phœnix Con.	25	2½	2			2		2		2		2	5½	605
Quincy	25	94		94	93	95	94	95		95½		94½		236
Rhode Island	25					1½				1½		1½		230
Santa Fe	10	2½	2	2		2		2	1½	1½		2		1,630
Shannon	10	6½	5½	6	5½	6		6½	6	6	5½	6	5½	5,525
Tamarack	25	120		124	116	122	120			124	122	122		300
Trinity	25	8½	8	8	7½	8½	7½	8½	8	9½	8½	9½	9	9,901
Union C. L'd & Mg	25	3		3½	3	4½	3½	4½	4			4		3,802
United States	10	22	21½	23⅜	21½	24½	23½	25½	21½	25⅜	25	25½	24½	55,964
U.S.Coal & Oil	25	10½		10½	10½	11½	10½	12	11½	12½	11½	11½	11½	5,820
Utah Con	5	42½	41½	41½	41½	42½	41½	42½	41½	42½	41½	41½	41	15,162
Victoria	25	3½	3½	3½	3½	3½	3½	3½	3½	3½		3½		3,285
Winona	25	9½		9		9½	9	9½		9	8½			1,235
Wolverine	25	95½	95	96	94	96½	95½	96½	96	97	96	97	96½	610
Wyandot	25	1½		1½	1	1½	1	†2½		2½	2½	2½	2½	3,985

*Ex-dividend. †Assessment paid. Total sales, 253,973 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Oct. 12		Oct. 13		Oct. 14		Oct. 15		Oct. 17		Oct. 18		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allis-Chalmers	$100					12	10½	12½	12	12		11½		2,500
Allis-Chalmers pf.	100	49½				49		50½	50	50½	50	50½	50½	2,000
Am. Agri. Chem	100					18		19						300
Am. Agr.Chem.pf.	100													
Am. Sm. & Ref.	100	65½	65	66½	65½	67⅛	66½	67⅛	66½	68	67½	67½	66½	40,683
Preferred	100	107½	107	108	107½	108½	108	109	108½	110	109	109½	109½	9,110
†Cambria Iron	50	47						47		47		46½		116
†Cambria Steel	50	24	22½	23½	22½	24	23½	24½	24	24½	24¼	24½	24¼	23,041
Col. Fuel & Iron	100	36½	35½	37½	36	38	37½	39	38½	39½	38½	39½	37½	32,115
Col. & H. C. & I.	100			12½	12½	12½		14½	12½	14½	13½	13½	13½	3,550
†Lehigh C. & N.	50	88½	88	89½	88	90½	89½	91	90½	92	91½	92	91½	3,950
*Mong. R. Coal	50													
*Mong. R. Coal pf.	50	23½				23½	23	22½						771
National Lead	100	24½	23½	24½	24	25½	24½	25½	24½	24½	24½	24½	23½	34,678
Preferred	100	95		97	96	96½	95	95½		97½		97½	97	1,350
†Phila. Nat. Gas.	50	42½	42½	42½	42½	43½	43	43½	43½	43½	43½	43½	42½	16,542
Preferred	50	46		46		46½	46	46½		47½	43½	47½	47½	2,806
*Pittsburg Coal	100	16	15½	15½		17	16	16½		16½	16½	17	16½	1,366
Preferred	100	71	68½	71½	70½	72	69½	72½	72			72½	70½	5,612
Republic I. & S	100	11½	11½	11½	11½	12	11½	12½	12	13	12½	12½	12½	15,475
Preferred	100	51		52	50½	52½	52	53	52½	54½	52½	54½	53½	25,685
Sloss-Shef. S. & I	100	43	42	43½	42½	44½	43½	45	44½	45½	45	46½	45½	7,466
Preferred	100			89½		91	90							410
Standard Oil	100	644		645½	643	645		650	647	651	649½	649½	647½	333
Tenn. C. I. & R.R.	100	51	50½	52½	50½	54½	52½	57½	55½	58½	56½	57½	56½	50,425
U. S. Steel Corp	100	19½	18½	19½	18½	20½	19½	21½	20½	22½	21½	22½	21½	469,888
Preferred	100	77½	76½	78	76½	79½	78	81½	80½	83½	81½	83½	82½	605,626
Va.-Car Chem.	100	34½	34½	36	34	36	35½	36	35½	36	35½	35½		9,985
Preferred	100	106½		108½	107½	108½	107½	108½	108	108½	108½	109	108½	10,530

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange
Total sales, 1,376,313 shares. ‡Ex-dividend.

STOCK QUOTATIONS.

SAN FRANCISCO.*

Company.	Location.	Oct. 6 H.	Oct. 6 L.	Oct. 7 H.	Oct. 7 L.	Oct. 8 H.	Oct. 8 L.	Oct. 10 H.	Oct. 10 L.	Oct. 11 H.	Oct. 11 L.	Oct. 12† H.	Oct. 12† L.	Sales.
MacNamara	Nev.	.36	.35	.....	.....	.37	.....	.37	.35	.36	.....	.....	.....	7,100
Mont. Tonopah	Nev.	1.85	.....	187½	1.80	.....	.....	192½	.....	197½	1.95	.....	.....	1,150
Ton. Belmont	Nev.	.....	.....	.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Ton. Midway	Nev.	.48	.42	.45	.44	.46	.45	.47	.....	.48	.47	.....	.....	15,400
Ton. Mg. Co	Nev.	.....	.....	.....	.....	812½	.....	.....	.....	8.00	.....	.....	.....	300
Ton. North Star	Nev.	.15	.14	.....	.....	.15	.14	.....	.....	.....	.....	.....	.....	9,600

*San Francisco & Tonopah Exchange. Total sales, 34,550 shares. †Quotations not received.

SAN FRANCISCO (By Telegraph).

Company.	October. 17	October. 18	Company.	October. 17	October. 18
Belcher	$0.26	$0.26	Gould & Curry	$0.18	$0.18
Best & Belcher	1.15	1.15	Hale & Norcross	.60	.60
Caledonia	.49	.49	Mexican	1.15	1.05
Challenge Con.	.20	.19	Ophir	2.25	2.25
Chollar	.19	.19	Overman	.16	.16
Confidence	.90	.85	Sierra Nevada	.29	.29
Con. California & Virginia	1.45	1.40	Union Con	.40	.35
Crown Point	.11	.08	Yellow Jacket	.19	.19

COLORADO SPRINGS (By Telegraph).

Company.	Oct. 17 H.	Oct. 17 L.	Oct. 18 H.	Oct. 18 L.	Company.	Oct. 17 H.	Oct. 17 L.	Oct. 18 H.	Oct. 18 L.
Anaconda	.12	.10	.12	.10	Jack Pot	.05	.03½	.05	.03½
C. K. & N.	.....	.....	.22	.21	Last Dollar	.25	.....	.25	.....
Cripple Ck. Con.	.09½	.04½	.10	.09½	Mollie Gibson	.04½	.....	.04	.....
Doctor Jack Pot	.04½	.04½	.04½	.04½	Moon Anchor	.07½	.06½	.07½	.....
Elkton Con	.66½	.66½	.66½	.66½	Old Gold	.10	.09	.09½	.08½
El Paso	1.18	1.17	1.16½	1.16½	Pharmacist	.....	.....	.....	.....
Gold Dollar	.06½	.06	.06	.05½	Portland	1.75	1.65	1.80	1.60
Gold Sovereign	.06½	.06½	.06½	.06½	Vindicator Con	.70	.60	.70	.69
Isabella	.22	.19½	.20½	.20	Work	.09	.08 5/16	.08 5/16	.09

ST. LOUIS, MO.* Oct. 15

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Am. Nettie, Colo	$10	$0.17	$0.25	Columbia Lead, Mo.	$10	$0.25	$1.00
Catherine Lead, Mo	10	.50	1.00	Con. Coal, Ill	100	14.00	15.50
Central Coal & C.	100	62.00	63.50	Doe Run Lead, Mo.	100	110.00	115.00
Central C. & C. Pf	100	71.00	72.00	Granite Bimet., Mt.	10	.30	.40
Central Lead, Mo.	100	110.00	117.00	St. Joe Lead, Mo	10	14.00	15.00

*By our Special Correspondent.

DULUTH, MINN. Oct. 15.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Calumet & Arizona	$10	$98.00	$99.50	Lake Sup. & Pitts	$10	$52.50	$53.00
Calumet & Bisbee	10	.....	2.00	Pitts. & Duluth Dev	15	78.50	80.00
Calumet & Pittsburg	10	43.00	44.00	Shakespeare	1	.....	.20
Higgins Development	10	.....	1.00	United Mexican	10	.....	.25
Junction Development	15	53.00	53.50	Wolverine & Arizona	10		1.50

MONTREAL.* Oct. 14.

Company.	Par Val.	High	Low	Sales	Company.	Par Val.	High	Low	Sales
Dominion Coal	100	56.50	55.00	157	Montreal Steel	100	50.00	35.00	.....
Dom. Coal, Pf	100	110.50	.....	25	Mont'l Steel, Pf	100	90.00	.....	.....
Dom. I. & St	100	14.37½	13.25	970	Nova Scotia St.	100	67.25	62.75	2,088
Dom. I. & St., Pf.	100	43.00	40.50	270	N. S. Steel, Pf	100	.....	.....	.....

*Montreal Stock Exchange. Total sales, 3,510 shares.

MEXICO. Oct. 7

Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				Soledad, aviada	$670	$985	$1,000
Ca. Min. de Penoles	2,500	$2,700	$3,200	Sorpresa, aviada	960	302	305
San Andres de la Sierra	200	10,000	.....	MEXICO:			
GUANAJUATO:				Aldebarren	2,000	58	65
Cinco Senores y An. aviadoras	2,000	34	36	Buen Despacho	3,000	55	57
Cinco, Senores y An. aviada	400	34	36	Dos Estrellas	3,000	2,400	2,500
Providencia, San Juan de la Luz	6,000	70	80	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				Santa Ana, Esperanza	2,400	15	30
Garduno y Anexas	7,200	35	40	NUEVO LEON:			
HIDALGO:				La Fraternal	1,000	580	620
Amistad y Con	9,600	73	75	Norias de Bajan	1,000	880	920
Carmen, aviada	1,100	150	170	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mill	1,000	170	200	Concepcion y An	3,000	40	52
Guadalupe Fresnillo Mine	1,400	70	80	El Barreno, aviadora	2,000	84	85
Maravillas y An., aviador	1,680	100	130	Sta. Maria de la Paz	9,600	209	218
Maravillas el Lobo	1,000	130	180	ZACATECAS:			
Refugio, aviada	12,800	680	740	Asturiana y An	2,500	10	15
Sta. Gertrudis y An. aviadas	9,600	12	14	Candelaria y Pinos	2,500	38	43
Sta. Gertrudis y An. aviadora	28,800	74	76	San Carlos y Anexas	2,500	40	50
San Rafael y An., Trompillo	1,200	1,950	1,960	Sta. Maria de Gaud.	2,500	85	90
San Rafael y An., aviada	1,200	705	720	MISCELLANEOUS:			
				Bartolome de Medina	2,000	98	102
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	95	100
				San Francisco Hac.	6,000	96	105
				Union Hacienda	3,000	325	355

LONDON. Oct. 7

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:		£ s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	200,000	5 0 0	2 0	July, 1904	4 12 6	4 17 6
Anaconda	1,200,000	5 0 0	2 0	May, 1904	5 0 0	5 2 6
Camp Bird	820,000	1 0 0	9	Oct., 1904	1 8 3	1 8 9
Copiapo	112,500	2 0 0	6 10	May, 1903	1 0 0	1 5 0
De Lamar	80,000	1 0 0	1 6	May, 1904	13 9	16 3
El Oro	1,080,000	1 0 0	9	July, 1904	18 9	1 1 3
Esperanza	455,000	1 0 0	6	Aug., 1904		
Frontino & Bolivia	128,662	1 0 0	3 0	July, 1901	8 6	9 6
Le Roi	200,000	5 0 0	5 0	Nov., 1899	13 9	16 3
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	10 0	12 6
Palmarejo & Mexican	445,000	1 0 0	rts.	Apr., 1903	8 3	8 9
Standard	500,000	4 0	2½	Sept., 1903	2 0	3 0
Stratton's Independence	1,000,007	1 0 0	6	Dec., 1903	2 6	3 9
St. John del Rey	546,265	1 0 0	6	Dec., 1903	12 6	13 9
Tomboy	300,000	1 0 0	1 0	June, 1902	17 6	1 2 6
Ymir	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
*Linares	15,000	3 0 0	5 0	Sept., 1904	3 10 0	4 0 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	2 15 0	3 0 0
Rio Tinto	325,000	5 0 0	37 6	May, 1904	56 12 6	56 17 6
Rio Tinto, preferred	325,000	5 0 0	2 6	May, 1904	6 2 6	6 7 6
Tharsis	625,000	2 0 0	7 0	May, 1904	4 10 0	4 15 0
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	1 18 9	2 1 3
Cosmopolitan	400,000	1 0 0	1 0	Apr., 1904	6 0	6 6
Golden Horseshoe	300,000	5 0 0	6 0	Aug., 1904	6 2 6	6 5 0
*Great Boulder	1,750,000	2 0	9	Sept., 1904	19 9	1 0 3
Gt. Boulder Persever'ce	1,400,007	1 0 0	1 0	Sept., 1904	12 6	13 0
Great Fingall	250,000	1 0 0	7 0	Oct., 1904	7 13 9	7 16 3
Ivanhoe	200,000	5 0 0	5 0	Oct., 1904	7 5 0	7 7 6
Kalgurli	120,000	1 0 0	2 6	Oct., 1904	5 5 0	5 7 6
Lake View	250,000	1 0 0	1 6	Oct., 1904	1 2 6	1 5 0
*Oroya-Brownhill	450,000	1 0 0	3 0	Sept., 1904	3 10 0	3 11 3
Miscellaneous:						
Brilliant Central	100,000	1 0 0	1 0	Oct., 1904	2 0 0	2 5 0
Briseis	600,000	1 0 0	.....	.....	11 6	12 0
Broken Hill	960,000	8 0	1 0	Aug., 1904	1 19 0	2 0 0
Mt. Lyell	275,000	3 0 0	1 3	June, 1904	11 6	12 6
Mt. Morgan	1,000,000	1 0 0	3	Oct., 1904	2 6 3	2 8 9
Waihi	497,412	1 0 0	2 6	Sept., 1904	5 10 0	5 12 6
Indian:						
Champion Reef	513,832	10 0	1 4	Sept., 1904	1 10 6	1 11 6
Mysore	566,043	10 0	4 6	July, 1904	6 8 9	6 11 3
Nundydroog	484,000	10 0	1 3	July, 1904	1 15 0	1 16 3
Ooregum	343,000	10 0	1 3	Aug., 1904	15 0	16 0
Ooregum, pfd	240,000	10 0	4	Aug., 1904	1 3 9	1 6 3
South African:						
Angelo	600,000	1 0 0	7 0	Aug., 1904	6 15 0	6 17 6
Bonanza	200,000	1 0 0	8 0	Aug., 1904	1 2 6	1 5 0
British South Africa	4,436,019	1 0 0	rts.	May, 1899	1 8 9	1 10 0
Cape Copper	300,000	2 0 0	2 6	July, 1904	3 17 6	4 2 6
Cape Copper, pfd	75,000	2 0 0	2 6	July, 1904	3 15 0	4 0 0
City & Suburban	340,000	4 0 0	4 0	Aug., 1904	5 0 0	5 2 6
Consol. Gold-Fields	2,000,000	1 0 0	.....	.....	6 5 0	6 6 3
Crown Reef	120,000	1 0 0	9 0	Oct., 1904	15 0 0	15 10 0
De Beers, preferred	800,000	2 10 0	10 0	Aug., 1904	18 3 9	18 6 3
De Beers, deferred	1,000,000	2 10 0	12 6	Aug., 1904	18 8 9	18 11 3
East Rand	990,000	1 0 0	5 0	July, 1903	8 3 9	8 5 0
Ferreira	90,000	1 0 0	22 6	Aug., 1904	20 10 0	21 0 0
Geldenhuis	200,000	1 0 0	7 0	Aug., 1904	5 10 0	5 12 6
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 8 9	6 11 3
Henry Nourse	125,000	1 0 0	8 0	Aug., 1904	7 17 6	8 2 6
Jubilee	50,000	1 0 0	5 0	Aug., 1904	4 12 6	4 17 6
Jumpers	100,000	1 0 0	2 6	May, 1904	2 7 6	2 12 6
Langlaagte	470,000	1 0 0	2 0	Aug., 1904	3 12 6	3 15 0
May	288,750	1 0 0	3 0	Aug., 1904	4 0 0	4 2 6
Meyer & Charlton	100,000	1 0 0	5 0	Aug., 1904	5 5 0	5 10 0
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	8 18 9	9 1 3
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 17 6	3 2 6
New Jagersfontein	200,000	5 0 0	15 0	Oct., 1904	27 5 0	27 15 0
New Primrose	325,000	1 0 0	3 0	Aug., 1904	3 11 3	3 13 9
Rand	1,795,956	5 0 0	5 0	Aug., 1902	10 7 6	10 8 9
Robinson	750,000	5 0 0	6 0	Aug., 1904	9 7 6	9 12 6
Robinson Deep	950,000	1 0 0	3 0	Aug., 1904	5 6 3	5 8 9
Rose Deep	425,000	1 0 0	3 0	Aug., 1904	8 12 6	8 17 6
Salisbury	100,000	1 0 0	2 0	Sept., 1904	1 15 0	2 0 0
Village Main Reef	400,000	1 0 0	4 0	July, 1904	6 8 9	6 11 3
Wemmer	80,000	1 0 0	12 6	July, 1904	10 10 0	11 0 0

*Ex-dividend.

LONDON (By Cable).*

Company.	Oct. 12 £	Oct. 12 s.	Oct. 12 d.	Oct. 19 £	Oct. 19 s.	Oct. 19 d.	Company.	Oct. 12 £	Oct. 12 s.	Oct. 12 d.	Oct. 19 £	Oct. 19 s.	Oct. 19 d.
Camp Bird	1	8	0	1	8	0	Esperanza	.....	16	3	.....	18	1½
Con. Gold Fields	6	8	9	6	13	9	Modderfontein	9	5	0	9	8	1½
De Beers	18	10	0	18	5	0	Rand Mines	.....	10	0	.....	10	0
Dolores	1	5	3	1	5	3	Rio Tinto	57	10	0	58	10	0
East Rand	8	6	3	8	6	10½	Simmer & Jack	1	15	0	1	16	0
El Oro	1	0	0	1	0	0	Tomboy	.....	19	4½	1	1	3

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Sept. 22.

Company.	Location.	Capital Stock.	Par value.	Latest dividend.	Prices. Opening.	Prices. Closing.
		Francs.	Fr.	Fr.	Fr.	Fr.
Anzin, Coal	France	.....	.....	290.00	5,725.00	5,710.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2,245.00	2,260.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.75	16.75
Courrieres, Coal	France	600,000	500	110.00	2,910.00	2,949.00
Fraser River, g	Brit. Col	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	92.75	93.75
Laurium, z, l	Greece	16,300,000	500	25.00	309.00	309.00
Malfidano, z	Italy	12,500,000	500	50.00	625.00	630.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	510.00	505.00
Mokta-el-Hadid, i, l	Algeria	18,312,000	500	40.00	1,022.00	1,010.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	639.00	610.00
Penarroya, Coal	Spain	.....	500	45.00	1,130.00	1,136.50
Vielle Montagne, z	Belgium	9,000,000	30	30.00	778.00	778.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos(Greek)h.gr	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01¾@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10
Powdered	"	.10½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.19
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal.	2.40@2.42
Refined wood, 95@97%	"	.60@.65
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Porous	"	.90
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lb.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua 16°	lb.	.02½
18°	"	.02½
20°	"	.03½
26°	"	.05
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08½
Muriate gram	"	.05½
Lump	"	.09½
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05½@.07½
Oxide, com'l white, 95%	"	.09½
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.02½@.03½
Red	"	.06½@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah, ordin'y	"	.03
Select	"	.03½
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	"	21.00
Trinidad, refined	"	35.00
Ventura, Cal	"	32.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton	25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01½@.02
Chloride, com'l	100 lb.	1.50@1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.06½
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-white	"	15.00@15.50
Floated	"	15.75@16.00
Foreign gray	"	13.50
Snow-white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.25@5.50
Second grade	"	4.50@4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02½
BORAX	"	.07½@.07½
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lb.	2.00@2.50
CALCIUM—Acetate, gray	"	1.87½
Acetate, brown	"	1.25
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt	lb.	.05
Chloride	100 lb.	.70@.90
CEMENT—		
Portland, Am., 400 lb.	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.80
Slag cement	"	.75@1.25
CERESINE—		
Orange and Yellow	lb.	.13½
White	"	.15
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04½@.04½
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton	19.00@19.50
Bricks, f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton	7.75@8.00
Am. best, ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lb.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	1.40
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitroglycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11½@.11½
FELDSPAR—Ground	sh. ton	9.75@10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—Am. f. o. b. Providence, R. I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
Ceylon, common pulv	lb.	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv.	"	.01½@.01½
Best pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lb.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01½
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
LEAD—Acetate, white	lb.	.08½@.08½
Brown	"	.06½@.06½
Nitrate, com'l	"	.06½
" granular	"	.08½
LIME—Com., abt. 250 lb.	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece. Crude (95%)	lg. ton	6.50@7.00
Calcined	sh. ton	16.50@17.00
Bricks, best imp., f.o.b. N. Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160@200
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01½
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lb.	.55@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.68
MICA—N.Y.gr'nd, coarse	sh. ton	33.00@38.00
Fine	lb.	.00½@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr. 25@30, cold test	gal.	.11@.12
15, cold test	"	.12@.13
Zero	"	.16½@.17½
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.12½@.14
Dark, filtered	"	.16½@.17½
Light, filtered	"	.18½@.19½
Extra cold test	"	.23@.30
Gasoline, 86@90	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.36½@.41
Boiled	"	.43
Calcutta, raw	"	.55
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10½
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05½@.06
English glassmakers'	"	.08½@.08½
Lithophone	"	.02½@.06½
Metallic, brown	sh. ton	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01½
Orange mineral, Am.	"	.07½@.08
Foreign, as to make	"	.07@.10½
Paris green, pure, bulk	"	.11
Red lead, American	lb.	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.55½
White lead, Am., dry	lb.	.05@.05½
American, in oil	"	.06@.06½
Foreign, in oil	"	.09@.09½
Zinc, white, Am., extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASH— Caustic, ordinary	lb.	.04½
Elect. (90%)	"	
POTASSIUM— Bicarbonate cryst.	"	.08½
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08½
Scotch	"	.08½@.08½
Bromide	"	.30
Carbonate (80@85%)	"	3.50@4.00
Chlorate, powdered	"	.06½@.07½
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19@.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lb.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09½
Prussiate, yellow	"	.14½@.14½
Red	"	.35½@.36
Sulphate, 90%	100 lb.	2.11
96%	"	2.14
Sylvinit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lb.	3.45
Refined	"	4.00@4.50
SILICA— Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.36
Oxide	"	.85@1.10
SODIUM— Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06½
Carbonated ash, high test, in bags, f.o.b. works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 70@76%, f.o.b. works	"	1.77½@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06½@.06½
Hyposulphite, Am	"	1.60@1.65
German	"	1.70@1.90
Peroxide	lb.	.45
Phosphate	"	.02½@.02½
Prussiate	"	.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
Sulphide, crystals, bbl.	lb.	.01½
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	100 lb.	2.50
Italian, best	"	2.25
TAR—Regular	bbl.	2.25
Oil,	"	4.75
TIN—Crystals, bbl.	lb.	.17
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02½
Chloride granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02 @.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.